vol. 1 no. 2
November, 1941

School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

2500 Mechanics Per Month
by Jack F. Ballantine

Inexpensive Midget Racing Car
by A. W. Dragoo

A Small General Shop
by Ralph E. Parker

Teaching the Functions of Alloying Elements
by Marshall L. Byrn

Tested Projects • News from Industry • What Do You Think? Personalities • Instructional Resources • Washington Letter

Wanted—Manuscripts

School Shop is seeking short, practical articles on shop subjects. Payment will be made on publication for material used. Articles are wanted in the following subjects:

Woodworking	***Electrical shop***	***Mechanical drawing***
Metalworking	***Handicrafts***	***Auto mechanics***
Machine shop	***Ceramics***	***Aeronautics***
Graphic arts	***Textiles***	***Etc.***

Descriptions of courses of study and curriculum changes are also desired as well as short items of a paragraph or two describing helpful practices in the school shop.

When preparing manuscripts, please keep the following points in mind:

1. The manuscript submitted should not have been published elsewhere.
2. Manuscripts should be typewritten and double spaced.
3. Title of the manuscript should be followed by the name and teaching position of the author, including the name of the school.
4. Illustrations will greatly enhance the value of manuscripts. Provide, if possible, large glossy photographs.
5. Line and working drawings and detail layouts should be as complete as possible, with lettering in black ink.
6. Drawings, illustrations, and photographs should include name of author and self-explanatory titles or legends.
7. Descriptions of projects should include complete list of materials, average time for completion of the project, and a few words on the educational value of the project.

Manuscripts should be addressed as follows:

THE EDITOR

SCHOOL SHOP

P. O. BOX 100, ANN ARBOR, MICHIGAN

An Explanation

of the Circulation Policy of *School Shop*

SCHOOL SHOP is being sent on a complimentary basis to all teachers and supervisors of shop subjects in the United States. The rate to all others, including library and school subscriptions, is $2 a year. Canadian and foreign subscriptions are $3 a year. Special rates apply to group subscriptions to teachers in training. Write for complete details.

This policy has been established by the publishers as a service to shop teachers. Publication of the magazine is made possible by the support of the reputable firms using advertising space in its columns. They deserve your support.

SCHOOL SHOP will be glad to add the names of shop teachers and supervisors who might not be included on the list at present. However, new names must be those of bonafide teachers or supervisors. Names will be added only when the request is made on school stationery and the subject taught is included. Send such requests to

CIRCULATION DEPARTMENT

SCHOOL SHOP

P. O. BOX 100, ANN ARBOR, MICHIGAN

Next Month's Highlights:

1. "The Jitterbug." A nine-foot plywood dinghy.
2. "Oakland's Class in Repair-Shop Mechanics."
3. "Student Control of Shop Service Responsibilities."
4. Shop-tested projects.
5. And these regular features: What Do You Think?; Instructional Resources; Washington Letter; Personalities; News from Industry.

Don't Miss Them in Next Month's Issue!

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School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

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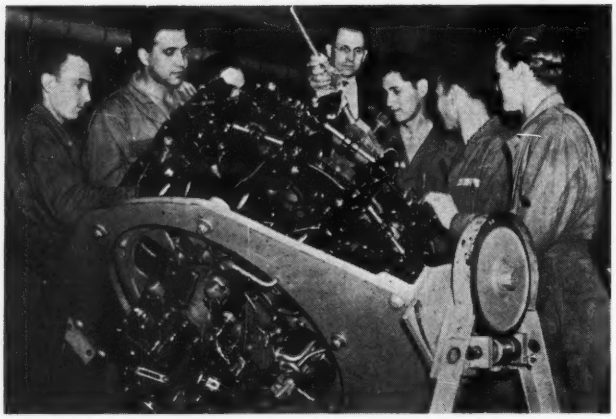


2500

Mechanics Per Month

trained at U. S. Army's Air Corps Technical School, Chanute Field

• *by* **Jack F. Ballantine**

THE nation's cry to "Keep 'em Flying" is not going unheard!

It is being answered in no small voice at Chanute Field, near Rantoul, Illinois, where ground technicians for the rapidly-expanding United States Army Air Corps are being turned out at the rate of 2,500 monthly.

Here on the wide prairie lands of east-central Illinois is located the largest of the Air Corps Technical Schools. Men from every state in the nation are being schooled in trades and professions necessary to the aircraft industry, building up a giant corps of trained technicians, the like of which the world has never seen.

The students are all enlisted men of the U. S. Army Air Corps. They come here for schooling, then return to Air Corps stations throughout the United States and foreign possessions to put to practical use the expert training they have received.

Two-thirds of the graduates of the Chanute Field branch of the Air Corps Technical Schools are airplane mechanics. The remaining third is composed of aircraft metal workers, machinists, welders, parachute riggers, weather observers, weather forecasters, Link-trainer instructors, teletypewriter maintenance men, and specialists in various phases of airplane mechanics such as electrical systems, instruments, and propellers.

It is the mechanics, the metal workers, the welders, and the machinists who are responsible for keeping sleek pursuit ships, bombers, interceptors, and fighters in constant trim. The weather men, parachute riggers, Link-trainer instructors, and teletype men, likewise, do their share to "Keep 'em Flying."

Perhaps their jobs lack the glamour of piloting a fast pursuit plane or a multi-engined bomber, but there is a thrill of satisfaction for them in knowing that the flying aces of the Air Corps depend on their work.

A city in itself, Chanute Field has a strength of about 18,000 men of whom approximately 12,000 are students. Its personnel, except for men permanently assigned to the post, is ever-changing, with graduates leaving and new men arriving weekly.

Its technical schools form an important part of the Air Corps Technical Training Command which embraces other schools at Scott Field, Belleville, Illinois; Lowry Field, Denver, Colorado; Keesler Field, Biloxi, Mississippi; Sheppard Field, Wichita Falls, Texas, and a number of civilian schools.

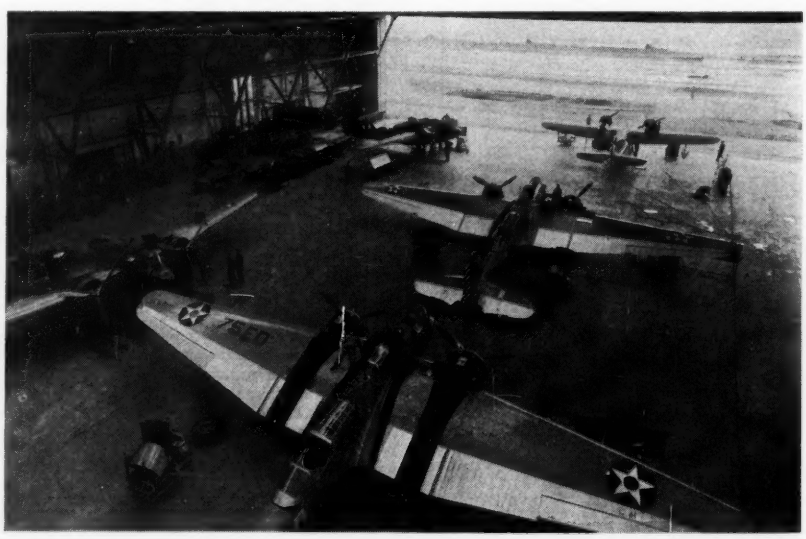
The Air Corps radio school is located at Scott Field while the armament, photography, and clerical schools are at Lowry Field. The fields at Biloxi and Wichita Falls, now being rushed to completion, will be used to supplement Chanute Field in the training of airplane mechanics.

All of the schools are under the supervision of Major General Rush B. Lincoln, commanding general of the Air Corps Technical Training Command, whose position is somewhat like that of the president of a large university.

The Chanute Field branch of the Air Corps Technical Schools is divided into three units: the Department of Mechanics, the Department of Link Trainer and Teletype, and the Department of Weather. An Air Corps officer serves as director of each department, working directly under Colonel R. E. O'Neill, commandant of the schools, and Lieutenant Colonel A. C. Kincaid, assistant commandant, who are responsible to Major General Lincoln.

A similar set-up is in effect at other Air Corps Technical Schools.

The airplane mechanics course is the major part of the Department of Mechanics, but this department also in-



Above: Students of airplane mechanics at Chanute Field working on an engine under supervision of civilian instructor. Right: Inside view of one of Chanute Field's large hangars, around which are grouped classrooms.

cludes the metalworkers', welders', machinists', and parachute-riggers' courses and the advanced instrument, electrical, and propeller courses.

The airplane mechanics course is the most popular with students by a large margin, its graduating classes averaging about 900 men every two weeks.

Divided into 11 phases, the airplane mechanics course lasts 22 weeks, giving students a thorough knowledge of construction and maintenance of airplanes. A student airplane mechanic starts the course with two weeks' basic instruction in shop mathematics, mechanical drafting, blueprint reading, Air Corps fundamentals, elements of electricity, and elements of metalwork; then advances into the intricacies of airplane structures, hydraulic systems, propellers, instruments, engines, ignition systems, fuel systems, engine operation and testing, single engine inspection, and multi-engine inspection.

The metal workers' course runs 14 weeks, the welders' course for a like period, the machinists' course for 20 weeks, and the parachute riggers' course for eight weeks.

If a student shows exceptional promise after completing the airplane mechanics course, he may be selected to take an eight-week specialist course in either electrical systems, instruments, or propellers.

The same is true in the Department of Weather where a student who shows promise after graduating from the 12-week observers' course may be chosen to take the more advanced forecasters' course which lasts 26 weeks.

Considered the stiffest of the Air Corps Technical Schools, the weather school makes a careful selection of Air Corps enlisted men to maintain a high scholastic standard. All of its students are high-school graduates who have taken the academic or college-entrance courses. Many are college trained.

Students of the Link-trainer course learn to maintain and operate trainers, invented by John Link, in which pilots take instrument flight training. Unfamiliar to most persons because it is a comparatively new apparatus, the Link trainer resembles a model plane. Operated by motors, the trainer turns and banks similar to an airplane. Its cockpit is equipped with all the instruments a pilot uses in instrument or "blind" flying.

Like the weather courses, the Link trainer course is highly technical, offering training in navigation and meteorology in addition to other practical subjects.

Instructors in the various schools are either civilians who have qualified for their positions through civil service examinations or enlisted men who have shown outstanding ability in their particular subject.

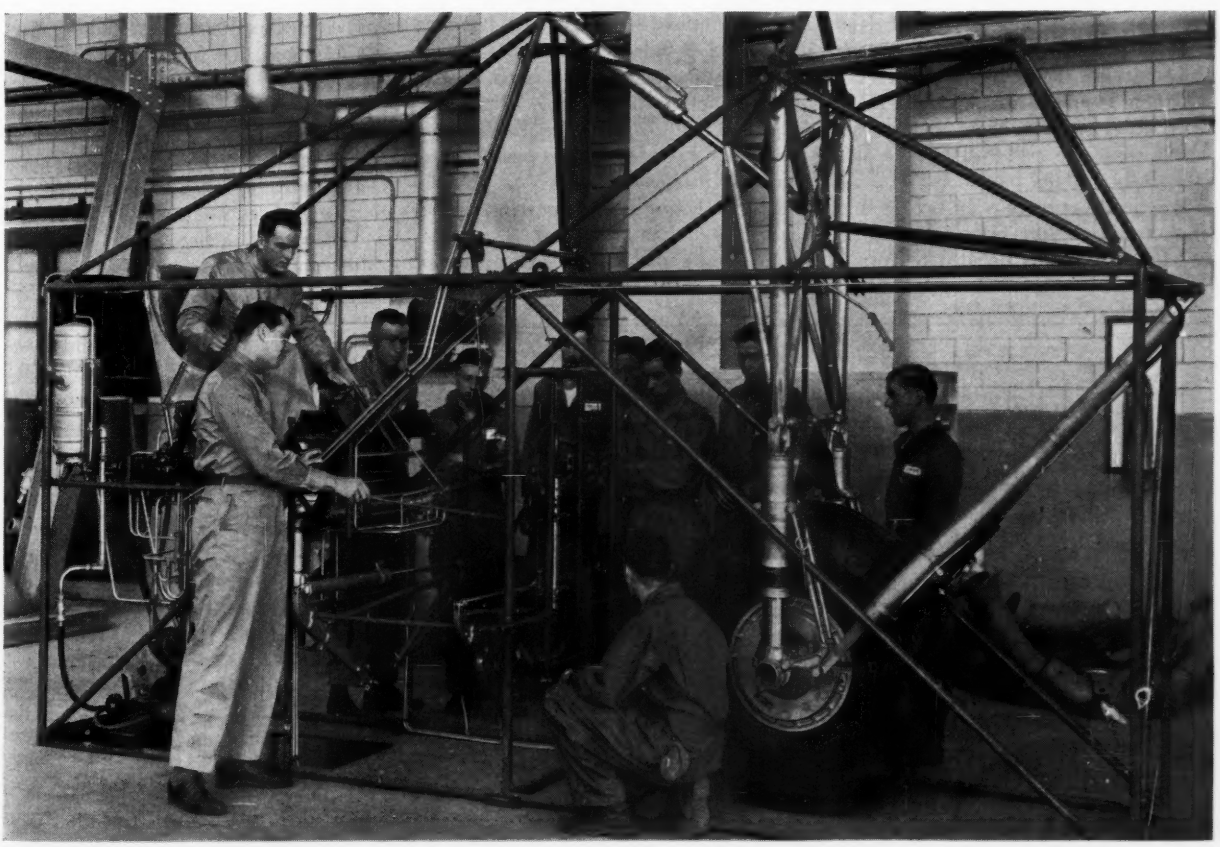
Classes are conducted in two eight-hour shifts, 6 A.M. to 1:45 P.M. and 2 P.M. to 9:45 P.M., in classrooms similar to those in any school building where trades classes with laboratory facilities are held.

Classrooms are located in one story brick, factory-type buildings which surround three sides of each of the field's huge hangars. There are three school buildings, each covering 4.9 acres.

New classes in airplane mechanics start every two weeks, while in other courses new classes begin at intervals ranging from one to three months.

Along with the schools for enlisted men, there is a school for aviation cadets who are given a seven-and-a-half month course in airplane maintenance engineering before being graduated and commissioned as second lieutenants in the Air Corps reserve. Requirements for admission to the engineering school include a psychological examination.

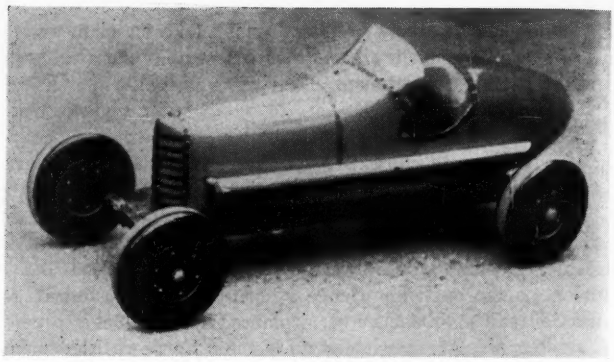
Students receive instruction in hydraulics on mockup of B-18 bomber.



Project of the Month:

Inexpensive Midget Racing Car

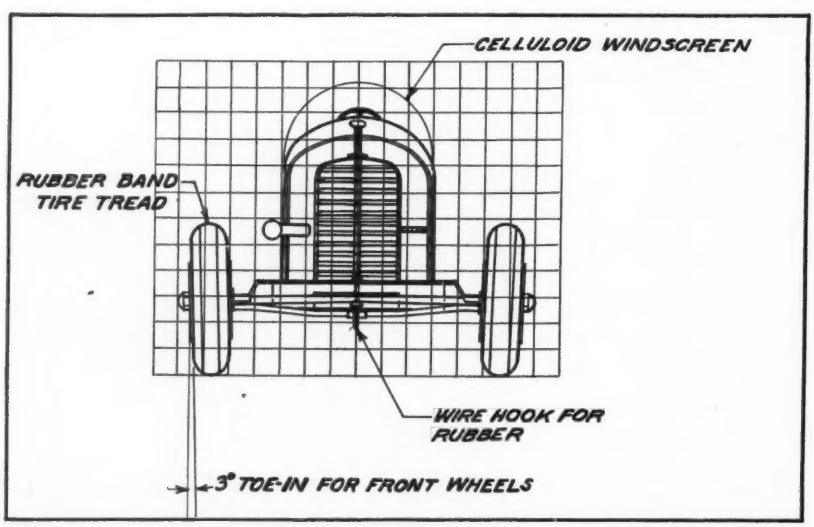
by **A. W. Dragoo**



This project is important not only for its socialization values but for the knowledge of engineering and related fields called for in its construction. A. W. Dragoo is Assistant Professor of Industrial Arts at Illinois State Normal University, and is the author of industrial arts texts.

MIDGET racing cars have a fascination for old and young alike. Father and son may share in the making, find pleasure and wholesome association in the testing and adjustment, and thrill at the amazing performance of the finished product. The midget cars powered with the small gasoline motor, such as are commonly used in model airplanes, have been constructed and perfected to the point where the tiny cars attain a speed of 65 to 75 miles per hour. These are, indeed, fine for the father and son who can afford the expense. Most of us, however, will not be able to raise the necessary 40 or 50 dollars required for the complete unit. This question of expense has prevented the use of the midget auto as an industrial arts project. A group of general shop boys from the University High School of the Illinois State Normal University set themselves to the task of designing a midget car which could be constructed within their means and which could be powered by the very inexpensive rubber band.

Practically every boy in two sections of the general shop classes became interested and it was decided to form a council to deal with the many construction problems arising. This council came to be known as the Junior Engineering Council because of the many engineering problems involved. Designers immediately set to work collecting information on the standard gas models. Standards for size, such as length, wheel base, tread, weight, etc. were decided on and all available information made accessible to all car builders. In all, 27 cars were designed and a complete set of full-size drawings with full details was made for each. Each boy designed his car according to his own notion, limited only by the general standards, set by the Engineering Council. Every effort was made to perfect the little cars as nearly as possible on paper before actual construction began. As in the design of all modern automobiles, many problems presented themselves once actual construction got under way. Many of these were brought before the council and everyone had an opportunity to make suggestions. Much was learned about friction, center of gravity, centrifugal force, effective steering, relation of weight to wheel traction, and many other important engineering and scientific problems.

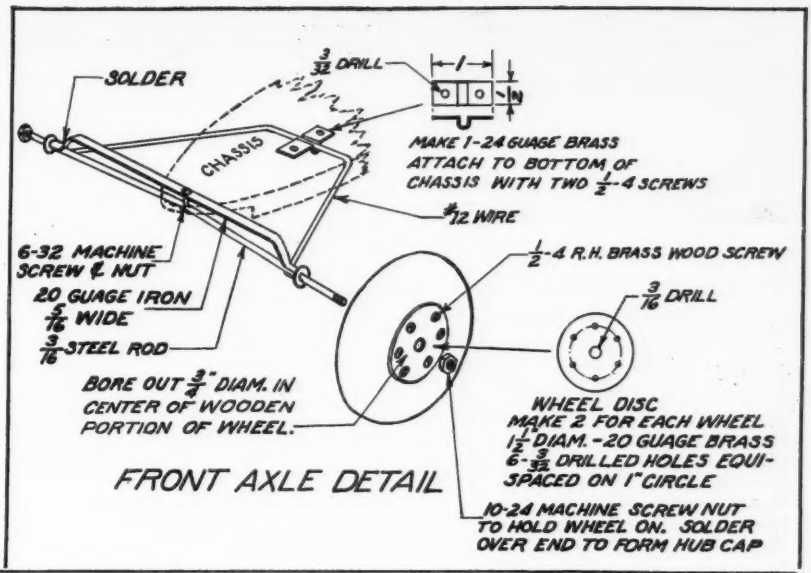


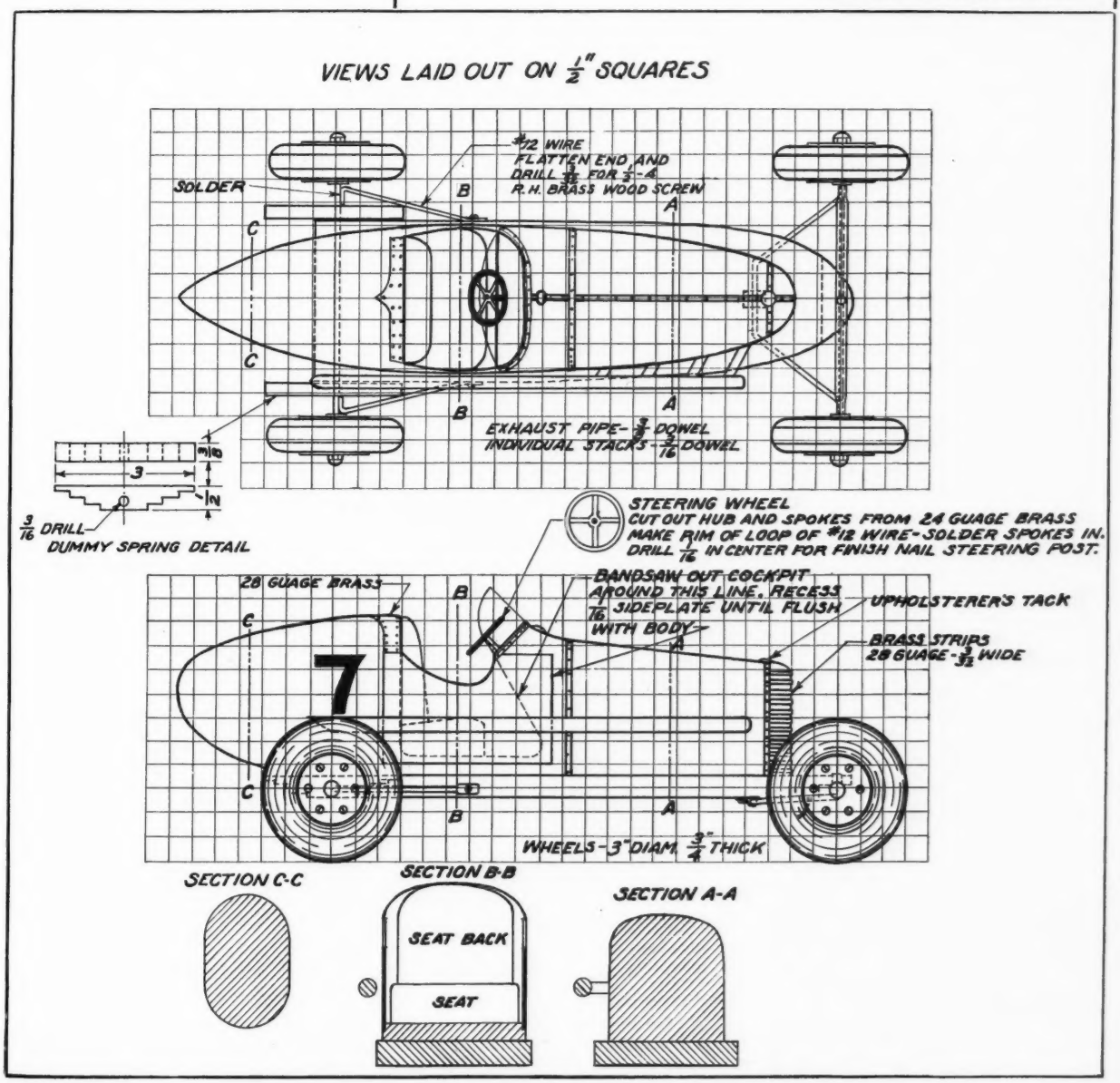
The design of the entire car had to take into account the kind and type of power to be used. This meant, at least for us, that some effective application of the rubber band must be found. Much experimentation was carried on in an effort to drive the car by direct application of the power to the wheels. This proved ineffective. Finally somebody suggested the possibility of attaching one end of a length of airplane rubber to the floor and the other end to a hook under the front end of the car. The car was to be pulled back thus stretching the rubber to near its limit of elasticity. By releasing the car it was found to spin along a straightaway course with excellent speed. A long narrow hallway was used for the testing and driving practice. Any length of rubber might be used, but for our use a strip of 3/16" airplane rubber six feet long was selected. A small triangular tab of leather was fixed to one end of the rubber and a short loop was tied in the other. A line was drawn across the floor and the leather tab was tacked down on this line with a large thumb tack. This line is known as the power line. The loop of the free end is now placed loosely over the hook under the front end of the car and the driver walks back to the starting line some 20 or 30 feet away. The car is placed on the starting line and released at the proper signal from the starter. When the car reaches the limit of the rubber ahead of the power line the loop drops off the hook and the car continues free-wheeling to the finish line.

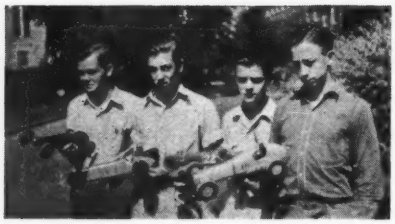
So effective did this type of power prove that a racing association was

formed with the two classes competing in the final racing contest held in a large gymnasium. Many of the boys brought out their cameras and amateur photography had a boom during the racing season. Even colored movies were made of the races, and succeeding classes view them and get suggestions for their cars. These races have been held two years at Normal and they have become so popular that each class looks forward to the sport many months before the season. Our season at Normal begins about February 1. At this time the design and construction begins and all cars are completed by about May 30, the day for the "Speedway" classic at Indianapolis.

This project has been carried out by freshman general shop students and


SOLDER
3/32 DRILL
1
N
CHASSIS
MAKE 1-24 GUAGE BRASS ATTACH TO BOTTOM OF CHASSIS WITH TWO 1/2-4 SCREWS
#12 WIRE
6-32 MACHINE SCREW & NUT
20 GUAGE IRON 5/16 WIDE
3/16 STEEL ROD
1/2-4 R.H. BRASS WOOD SCREW
3/16 DRILL
BORE OUT 3/4" DIAM. IN CENTER OF WOODEN PORTION OF WHEEL.
WHEEL DISC MAKE 2 FOR EACH WHEEL 1 1/2" DIAM. -20 GUAGE BRASS 6-3/32 DRILLED HOLES EQUI-SPACED ON 1" CIRCLE
10-24 MACHINE SCREW NUT TO HOLD WHEEL ON. SOLDER OVER END TO FORM HUB CAP
FRONT AXLE DETAIL





Some of the best.

offers some of the finest opportunities to put into practice those objectives we industrial arts teachers are so fond of repeating. We have never found a project with so universal an appeal as has this one. We have had airplane meets, kite tournaments, sail- and speed-boat classics, but all must give way to our famous "Floor-Drive Midgets." The accompanying drawings and photographs of the original midget "floor-drive" car will make clear the more important structural features. It should be suggested that experience has proven that balsa wood is too light for this car. White pine with its heavier weight helps the car to stay on the course. Some kind of rubber tires are essential to prevent skidding. Wide rubber bands or a section cut from an old bicycle inner tube serve the purpose well. Friction tape applied around the wooden wheel with the tire on the outside is insurance against the tire throwing. The speed attained by these midget cars for the 1940 races was 27.7 miles per hour. Timing was done by Coach O'Conner, athletic coach at University High School. In the 1941 races, a speed of more than 35 miles per hour was attained. The boys are talking 40 miles per hour for 1942.

Following is a list of events as used in our 1940-41 races held in Cook Hall gymnasium on the campus of Illinois State Normal University:

MIDGET CAR RACES
University High School
Illinois State Normal University

First Event—Elimination Race

This is a series of races consisting of four cars each with three heats to the race. To finish first a car must win two out of three heats. As many races will be run as there are cars to make up a

(*Continued on page 15*)

Making final adjustments.

Vocational Education—National Defense—Economic Security

THEME OF *AVA* CONVENTION

DEVELOPED under the theme "Vocational Education—National Defense—Economic Security," the program for the Boston convention of the American Vocational Association, December 10 to 13, will provide sessions and discussions centering largely on problems attending all-out achievements by the schools in defense job training.

The convention opens with a general session on Wednesday evening, December 10, in the ballroom of the Hotel Statler, convention headquarters in which all sessions of the industrial and industrial arts sections will be held. The annual banquet and dance are scheduled for Thursday evening in the ballroom.

Friday evening the A.V.A. House of Delegates will hold its annual meeting, followed by the program of The Ship, an organization of commercial exhibitors showing their products at the conventions. Their program this year is under the direction of Ralph Foss, of the McGraw-Hill Book Company. The convention climax comes with the annual Industrial Arts Luncheon at the Statler on Saturday.

Arrangements have been made for the following groups to hold their annual meetings preceding the opening of the A. V. A. Convention, most of them being scheduled for Wednesday afternoon: National Council of City Administrators of Vocational Education and Industrial Arts; National Association of State Supervisors of Industrial Education; Officers of State Vocational Associations; National Association of Teacher Trainers in Industrial Education; and the Trade School Principals Association.

• Industrial Education

John A. McCarthy, New Jersey State Director of Vocational Education, is chairman of the program committee for the industrial education section.

H. I. Harriman, vice-president of the American Youth Commission, and Dr. Charles Prosser, of Dunwoody Institute, will be featured speakers on a program arranged by Dr. Alonzo Grace, Commissioner of Education in Connecticut, giving attention to the effects of social legislation upon the full-time and long-term program of vocational education.

Relationships of the National Youth Administration to vocational education programs will be discussed in a program planned by Dr. B. H. Van Oot, Virginia State Supervisor of Trade and Industrial Education. Albert H. Hall, of the New York State Board of Education, is chairman of another section which will consider problems in extension courses for public employees.

The increasing importance of training girls and women will receive special attention under the direction of Miss Clara H. Krauter of the Essex County, N. J., Vocational School. Robert Dolley of Florida is preparing programs dealing with diversified occupations; John Beswick of California is in charge of the program for vocational defense training sectional meetings; Mrs. Betty Hawley Donnelly, Secretary of the New York Board of Education Advisory Committees, has been asked to prepare a special program dealing with labor's and industry's place in a full-time preparatory program; and E. K. Jenkins, Regional Supervisor of the Federal Committee on Apprentice Training, is preparing programs on apprenticeship problems.

Dr. Charles Bauder of the Philadelphia Board of Education, is arranging a program that will give attention to buildings and equipment. Speakers on this program will be Miss Violett O'Reilly of the Rabouin Vocational School, New Orleans; G. A. McGarvey, U. S. Office of Education; and Frank R. Robinson, of the Mastbaum Vocational School.

• Industrial Arts Education

Five special sessions on industrial arts education are being planned, according to Homer J. Smith, A.V.A. vice-president for this division. Five members of the A.V.A. Policies Committee for Industrial Arts are cooperating in preparation of the program: O. B. Badger, Oregon; Earl L. Bedell, Michigan; Roy A. Hinderman, Colorado; Frank C. Moore, Ohio; and Verne L. Pickens, Missouri.

Programs for the five sessions are being prepared by Edward C. Emerson, Boston, Chairman; Willis B. Anthony, Fitchburg, Mass.; Raymond W. Phipps, New Britain, Conn.; Augustus F. Rose, Providence; and Richard M. Savage, Gorham, Me.

Be Specific!

A DRAFTING TECHNIQUE CHECK LIST

by **M. F. Foss**

A REASONABLE and consistent growth in skill should be expected of students in any technical subject. Draftingroom technique should show this growth regardless of grade level.

Improved technique is not insured merely by grading plates. To place a grade of *C* on a plate and hand it back to the student does not help him make a grade of *B* on the next plate. Marking errors on the plate may call the student's attention to his shortcomings, but this procedure is time consuming, and many students object because it "spoils" their plate. Pointing out errors is ineffective as many students forget what the instructor has said before he has finished talking.

The following check list has been found easy to use and remarkably effective. Each student is given a mimeographed copy to keep with him as he works. When the instructor inspects the student's work he marks the errors which have been made on the check sheet, not on the drawing. This serves to call the student's attention to his errors, and by referring to the list he may correct his drawing before it is handed in.

This list has been used with ninth- to twelfth-year students. Enough sheets may be made up in advance for each student to have two or three copies which may be given out as they are needed.

Drafting teachers will find this check list a useful and speedy method of helping students to improve their work. Mr. Foss, who is instructor in industrial arts at Miami University, used this system when teaching all types of drawing—machine, architectural, and hobby—at the Washington, Pennsylvania, High School. When both beginning and advanced students were in the room, the check list was particularly helpful because of the limited time that could be given to the advanced students.

How to Improve Drafting Technique

A. General

1. Keeps hands clean.

2. Sharpen the pencil on emery-paper block and keep it sharp.

3. Erase lines clean. Don't leave lines and lettering partly erased.

4. Develop the habit of careful measurement. Don't be satisfied with a measurement 1/16 of an inch too large or too small.

B. Lines

1. Try to get a distinction in the weight of lines.

a) Blocking in lines should be so light that they can just barely be seen.

b) Visible outline (solid edges) should be heavy, dark, and above all, uniform in weight.

c) Dotted lines should be a little lighter in weight than solid lines.

d) Center lines should be very fine.

e) Cross-hatching lines should be very fine.

f) Border lines should be heavier than outline lines.

g) Dimension lines and extension lines are very fine.

2. Corners should be sharp and clean cut.

3. Outlines should be single lines. In case the outline does not follow the blocking-in line, erase the whole line and put it in again.

4. Dotted lines should be about $\frac{1}{8}$ inch long and spaced 1/16 inch apart.

5. If the dotted line meets the solid line at an angle, the dotted line must touch the solid line.

6. If the dotted line is a continuation of a solid line the dotted line must not touch the solid line.

7. Be sure all center lines are in.

8. In a center line, the long line should be about $1\frac{1}{4}$ inch long and the short line about $\frac{1}{8}$ inch long.

C. Dimensioning

1. Extension lines must not touch the view. Leave 1/16 to $\frac{1}{8}$ inch between the drawing and extension line.

2. Dimension lines touch the extension lines.

3. Arrow heads should be the correct size: $\frac{1}{8}$ inch long, 1/16 inch wide.

4. Dimension figures should be 3/16 inch high with fractions $\frac{1}{4}$ inch high.

5. Detail dimensions should be in line.

6. Dimensions should be evenly spaced, and between the views.

7. The sum of the detail dimensions should equal the over-all dimensions.

8. Are the dimensions right?

D. Lettering

1. Take time with the lettering and get the shape of the letters correct.

2. Use guide lines for all lettering (notes and titles).

3. Be sure guide lines are spaced correctly.

4. Be sure the lettering is placed in the proper guide lines.

View of the well-kept general shop in the Reliance High School.

A Small General Shop

Reliance, Wyoming, Has a Program that Works

by **Ralph F. Parker**

Here is a description of a general-shop program not only with objectives, but also with techniques whereby the objectives may be achieved. Procedures and teaching methods are given. Ralph F. Parker is teacher of industrial arts in the Reliance, Wyoming, High School.

THE general-shop idea has gained much favor throughout the schools in the United States which are interested in progressive education. The unit courses are very rapidly being displaced by composite courses which are using the convenient arrangement and equipment of a general shop.

If one is to recognize individual differences, then it is necessary to have a course of study that is flexible enough to meet the needs and interests of all students. The processes, operations, and jobs in the general shop are mostly suggestive and exploratory for the individual. It also allows an opportunity to encourage creative expression and original thinking. Most students of junior-high and high-school level do not have the background to choose even a hobby, let alone a vocation, so the general shop offers some experience in many departments of the industrial field.

General shop has come in response to a demand for socialized courses. It is generally believed that social efficiency is a greater factor in an individual's success than technical knowledge or his possession of manipulative skills. Social efficiency should not, however, entirely control the essential instructions in skills and technical knowledge, but it is possible to arrange these situations to promote social development.

Development of appreciation through the individual's experiences better equips him for adult life. Many definite occasions arise in later life that demand a response. A background of experiences will produce the more intelligent answer to life's problems. Provisions for work situations develop a need for cooperation, acceptance of responsibility, honest effort, and leadership among the individuals of the group.

Objectives of Our General Shop

1. Development of skills—proficiency in the use of tools and materials.

2. Development of desirable habits and attitudes—provisions for work situations which make for the development of cooperation, acceptance of responsibility, honest effort, and leadership.

3. Planning—the original thinking which precedes the working out of a problem: cost computation, design, selection of materials suitable to purpose.

4. Consumer knowledge—related information pertaining to materials and processes in use. Ability to select, care for, and use advantageously those materials common to students' regular work; understanding back of "handy man" abilities.

5. Opportunity for development of creative expression—the encouragement of original thinking and the offering of an opportunity for individual or creative work.

6. Development of leisure-time interests—the offering of many activities whose purpose is chiefly that of supplying worthwhile leisure-time interests.

7. Exploratory values—opportunity for experience in a variety of activities, vocational choices, or further education experiences.

8. Development of appreciation—understanding development through

experiences. The capability of response to a situation demanding a response.

Methods of Achieving These Objectives

1. Use of textbook.
2. Demonstration by instructor.
3. Actual work of student.
4. Developing hobbies.
5. Following interests of student.
6. Lectures by instructor and others.
7. Field trips.
8. Moving picture films.

Advancement Procedure for General Shop

In the first semester of the first year, woodworking is the basic course of all the units, and all first-year students are allowed to work only in this field. Skills, methods, and habits given in the textbook, *Instructions and Information Units for Handworking*, by Douglas and Roberts, McCormick-Mathers Co., publishers, is used as a course of study during the first semester. Written examinations encourage special study and definite information on the content. This applies especially to names of tools, kind of wood joints, sizes of screws, etc.

In the second semester, those students completing the necessary fundamentals in wood may continue or branch into other fields. Individual interests and abilities govern the units with this interest and ability.

New units offered during second semester are:

1. Woodturning.
2. Alabaster turning.
3. Foundry.
4. Mechanical drawing.
5. Tin work.
6. Electricity.

In the first semester of the second year, wood projects are required at the beginning to refresh skill, habits, and methods. Three-view working drawings with complete lumber bills are required before a project is started.

Students are then allowed to work in the unit or units in which they are most interested and show the most ability. They may continue in any unit as long as individual development is shown.

New units offered and suggested are:

1. Woodworking.
2. Woodturning.
3. Foundry.
4. Mechanical drawing.
5. Tin work.
6. Alabaster work.
7. Machine lathe.
8. Wood machines.
9. Forging.
10. Wrought iron.
11. Metal spinning.
12. Art-metal work.
13. Other units may be offered to meet the interest of any particular community.

The second semester is a continuation of the first semester with the instructor introducing new projects to develop interest and participation.

Teaching Techniques

Class time is one hour per day, five days per week.

Constant vigilance on the part of the instructor is important in order to keep the entire class progressing according to individual differences. Constant contact with pupils is absolutely necessary. Such a procedure, however, is relatively simple since the many units offered tend to attract and satisfy individual interests.

The daily class routine is as follows. The student's first duty on entering the shop is to unlock and check his personal desk tools. He then waits at his bench for roll call. Special instructions are given for the day and the instructor presents his short daily demonstration to advance or introduce some unit of work.

Tool-cage procedure is as follows. Tools all have a definite place on the walls of the cage. Two boys are assigned for a period of two weeks to check in and out the tools as they are needed and returned. One boy is known as the foreman and the other boy as his helper. The foreman is responsible for seeing that all tools are turned in and properly placed at the close of the period. The helper's duty is to speed up the checking of tools at the beginning and close of the period; however, a more important part of his job is to keep all tools that belong in the tool cage repaired and sharpened. The helper graduates to the foremanship during his second week.

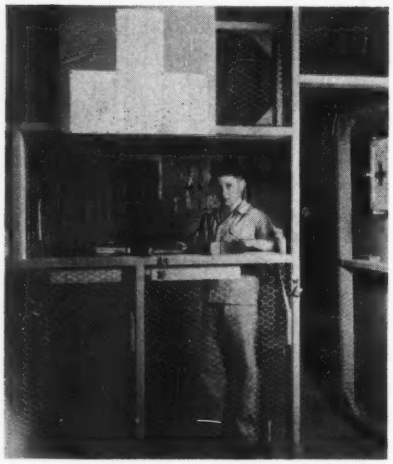
A three-view working drawing is made of each project. Two sets of material bills are made by the student—one for the instructor and one for himself. The date of beginning the project and the approximate cost of project must be included.

The supply of materials to be used throughout the year is purchased by the school at the beginning of the school year. This includes all materials for each of the 12 units taught and necessary finishes to be applied. Tin used in tin projects, aluminum and lead for foundry work, and steel for the machine lathe are brought in by the students.

Small amounts of stock and finishing materials are open for the student's use. Part of each student's training is the selection and cutting of needed materials without excess waste. The thinning of paints, varnish, shellac, etc., is also left up to the student. Thinning materials such as alcohol, turpentine, linseed oil, etc., are put in unlabeled containers. Students learn to identify these liquids and their uses by their odor.

The shop library consists of one woodworking textbook for each student. Each other unit is based on a selected text and a copy is kept for convenient use of the student. Many project and information

The author and one of his students. Note safety goggles in boy's hands and in cabinet.



The foreman and helper system is used in the tool cage.

books are also used to suggest ideas and to supply related information. Student originality in designing is encouraged as much as possible.

The student's name, project, materials used, date of project initiation and completion, and amount paid are recorded in the instructor's accounts. Actual payment of money is made to the high-school office. The student brings the receipt to the shop and is checked off for materials used—before taking his finished project. Monthly check is made between payment accounts of the office and shop.

Public display of the shop projects is made whenever possible. Class displays are made of new and unique projects to encourage a greater variety and more originality.

Outcomes of the General Shop

1. Development of skills in the use of tools and materials.
2. Vocational interests shown by the students for some unit or units offered by this exploratory course.
3. Completed projects which they have to show for their work.
4. Development of creative expression through the medium of some material.
5. Hobbies and interests created.
6. Consumer's knowledge and appreciation of skilled work.

A Suggested Training Policy for Skilled Occupations*

By **Leslie G. Stier**

BECAUSE of the neglect on the part of educators, management, labor and the general public to organize years ago a long-term or apprenticeship plan for training craftsmen, we are faced today with a lack of skilled workers in many trades.

In addition to this serious situation we are now facing an immediate expansion of water, air, and land armament for national protection. This will require every skilled craftsman available plus a host of operators and laborers.

To overcome this deficiency, the National Defense Training Program has been developed. One part of this program proposes to give immediate training to persons who have had some past industrial experiences, but need "brush-up" courses in certain operations so that they will become employable immediately. This should be recognized as short-term training and must not be confused with apprenticeship or *long-term training*.

Because of the need for clarifying objectives for these two training programs—the short-term and long-term—we think it advisable that educators, management, labor and the public must recognize:

1. That all present federal and state approved *preparatory training programs for skilled occupations in public schools* must be scrupulously safeguarded, so that a reasonable number of carefully selected young persons will always be in training. Proper recognition should be given for the time spent in a trade class in school so as to shorten the total time recognized by the trade to develop a journeyman. Preparatory classes act as a foundation for the long-term training program.

2. That all *present apprentice training programs* must be scrupulously safeguarded so that the work experiences in the trade and the four hours a week of technical instruction in a public school are of the type that will, over a period of years, develop a journeyman with all-round skills in his trade, technical knowledge, job intelligence, judgment, and good morale. This long-term work and school program has always been recognized as the most effective method to train future craftsmen.

3. That everything possible should be done *now* to sponsor, further, and add *additional apprentice training programs for all skilled trades* on some sound basis so that in years to come we need never be in the situation we are in at the present time; namely, a great industrial nation without adequate craftsmen.

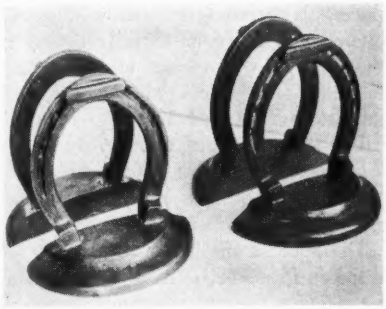
4. That it is necessary at the present time to *train rapidly a tremendous number of operators for specific payroll jobs* to meet the needs of defense industries. However, because of the short intensive training program in only one or a few operations these persons will probably never be recognized as craftsmen. This is the short-term training program and does not attempt to develop an all-round craftsman.

5. That to be "long-sighted" and plan now for the future through long-term training means more and better craftsmen later which in turn means occupational stability and effective competition for the world's markets.

*EDITOR'S NOTE: This timely clarification and exposition of policy was prepared for and published by the Frank Wiggins Trade School, a free public school in Los Angeles, California, of which Leslie G. Stier is the Principal. Mr. Stier is also a member of the Editorial Advisory Board of SCHOOL SHOP.

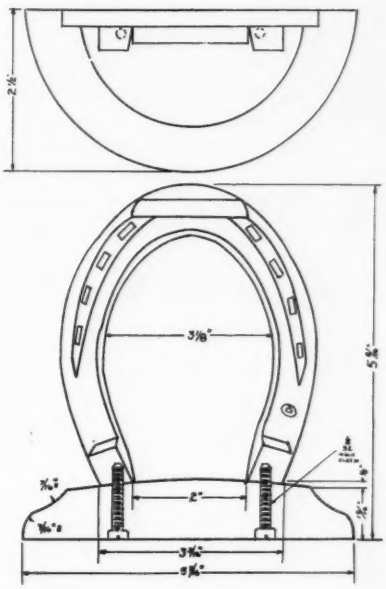
Tested Instructional Projects

—These projects have all been shop tested for school use



Horse Shoe Book Ends

by N. H. Poole



This project involves learning elements in many fields: woodworking, metalworking, forging, casting, patternmaking. N. H. Poole teaches general metalwork in the Emmerich Manual Training High School, Indianapolis, Indiana.

THIS is a simple project which enables the student to make his own book-end pattern, mold it, cast it, and polish it. The dimensions in this article refer to the sizes which have been found to be satisfactory, but it is possible to use various sizes of horse shoes and to vary the design of the base accordingly.

I. *Materials needed for the pattern*—One pair of number 0 horse shoes that are ready-to-wear (ready-to-wear means shoes that are toed and heeled). One piece of mahogany or poplar 1" x 6" x 6". Four 1½"—6/32 machine screws. Two pieces of red or green felt, each 3" x 6". Small amount of beeswax and plastic wood. Fine sandpaper, shellac, and brush.

II. *Materials needed for making the castings*—Brass, copper, cast iron, die-casting metal, lead, babbit, or white metal.

III. *Equipment needed for making the pattern*—Woodworking lathe, 6" face plate and turning tools. Hand drill, ⅛" and 5/32" twist drills. Center punch. Hammer. Screw Driver. Saw. Tap wrench and 6/32 tap. Half-round file.

IV. *Equipment needed for making the mold*—Flask, sand, rammer, swabs, slicks, spruce pin, gate cutter, and riddle.

V. *Equipment needed for heating the metal*—Cupola, brass furnace, crucible furnace, forge, or combination bench furnace.

VI. *Equipment needed for cleaning and polishing the castings*—Wire brush, cloth buffing wheels, and polishing compounds.

VII. *Procedure*—

1. Purchase a pair of number 0 ready-to-wear horse shoes from a blacksmith, a hardware store, or from a mail-order house. Center punch and drill ⅛" holes into the back of each heel. Tap these holes with a 6/32 tap.

2. Plane one surface of the mahogany wood and fasten it to the lathe face plate with short screws. Turn this stock to the size and design shown in the drawing. Keep the center high so that the pattern will have enough draft or taper to enable the molder to pull it out of the sand mold. After this piece, which makes the bases, has been turned and sanded, it is sawed in half. Plane the saw-cut surface smooth. Holes are drilled through the back of the bases with the 5/32" drill. Each base is now fastened to a horse shoe which completes the pattern. Holes are drilled into the top and base so that the pattern can be pulled out of the sand.

3. File all rough spots off the horse shoes. Be sure that each shoe has sufficient draft so that it will pull out of the sand. Check and see that all nail holes in the shoes are open. A beeswax fillet is placed at the point where the horse shoe heels and wood base meet. Fill the face plate screw holes with beeswax or plastic wood. Give the entire pattern two coats of shellac.

4. Mold in the usual manner. Foundry classes may use brass or copper while general shop classes may use die-casting metal, lead, babbit metal, or white metal for pouring their molds.

5. Clean and polish the castings.

6. Shellac the pieces of felt to the base of each book end. Let dry and trim to the shape of the base.

A Burglar-Proof Key Holder

by Harold O. Akeson

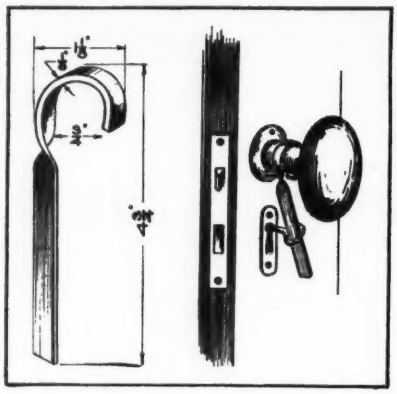
This is a simple metalworking project suitable for beginning students. Harold O. Akeson teaches metalwork in the East Orange, N.J., High School.

WHEN a door is locked from the inside and the device shown in the illustration is applied, it will keep the household safe from intrusion. The safety device will not only keep other keys from being inserted from the outside, but will also prevent the key from being

turned with instruments from outside.

This key device is very easily made. Use 1/8" by 3/8" band iron, 6 1/4" long. Bend one end around a 3/4" iron rod or broom handle. Then twist the curved end a half turn with a monkey wrench, while the lower part is in the vise, so that the flat of the piece is at right angles to the hook of the holder. This is done to allow for slipping it through the loop end of the key.

Smooth the rough edges with a file and rub with emery cloth. To make the job look finished, paint with a flat black or black lacquer.



A Smoking Cabinet

by Earl W. Boyer

HERE is a project for the school shop which is not only interesting to construct, but which when finished will be a beautiful and highly useful piece of furniture.

The details of construction and dimensions of the various parts are shown in the accompanying drawings. Walnut or mahogany adapts itself admirably to this piece of work. The writer used walnut and birch, the contrasting woods giving a pleasing color effect.

The posts for the two detachable stands are made from walnut rope molding or they may be carved from stock. The columns for the cabinet proper are turned from two pieces of walnut with a piece of birch glued in the middle. The use of cedar in connection with the birch and walnut at top and bottom of the small removable stands gives a three-tone effect which is very attractive and pleasing.

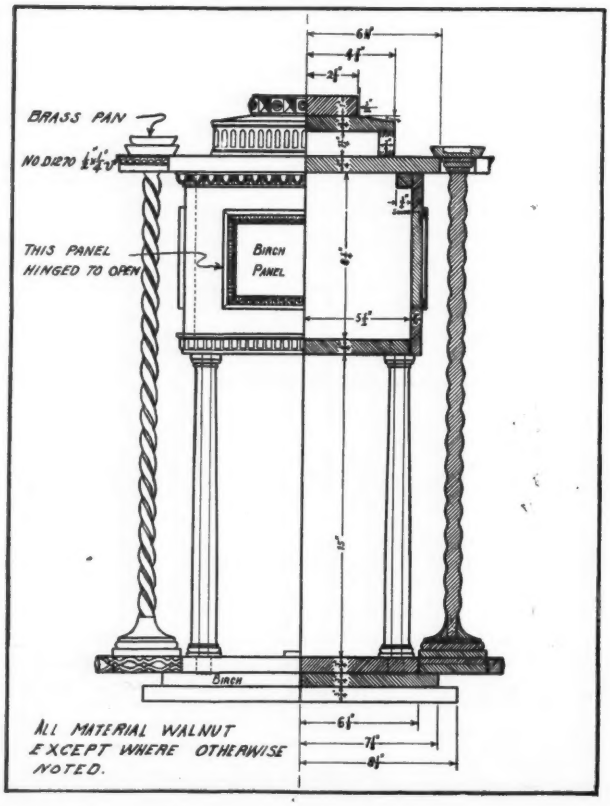
The boards for the box part of the cabinet should be cut to size and the ends mitered. The birch panels should be fitted and glued into the proper spaces. The moldings should then be mitered and glued on directly over the joints, thereby covering all traces of the removal of one kind of wood and the insertion of another.

The assembling of the various parts is simple. The entire job can be glued together so that it is not necessary to use any nails or screws.

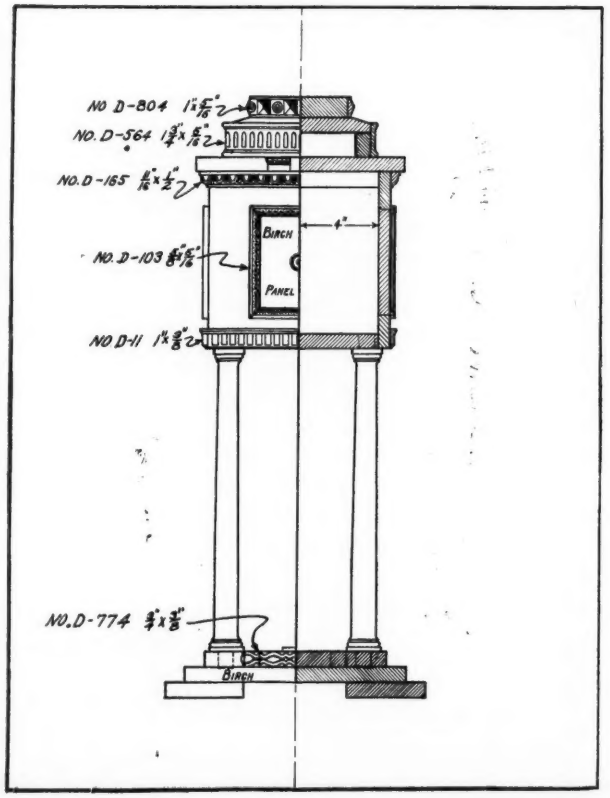
The opening mechanism for the door is shown in isometric as if viewed from the inside in the accompanying drawing. The whole mechanism consists of a simple arrangement of a spring, a rod, a lever, and a wedge block. A wire-spring clothes pin may be used instead of a compression spring. When the rod, extending through the bottom, is pulled, the lever, which is pivoted near the

This project provides an excellent opportunity to discuss the general question of furniture decoration and could be used by the shop teacher to introduce the question of the origin and application of the various architectural moldings now available in most communities. Earl W. Boyer teaches in the Dobbins Vocational School, Philadelphia, Pennsylvania.

Front elevation and section.



Side elevation and section.



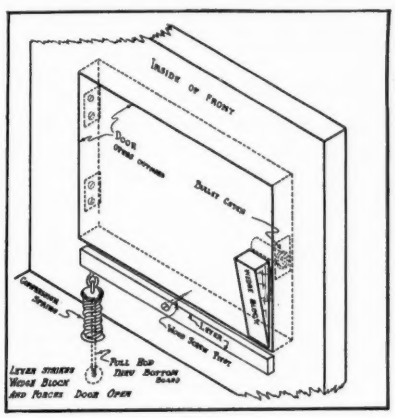
center, kicks up and strikes the wedge block fastened on the door. This pressure disengages the bullet catch, and the door swings open automatically. The purpose of the spring is to push the lever back into its original position so the door may be closed again. This arrangement eliminates the necessity of a knob on the door. The opening mechanism for the door arouses the interest of anyone who likes to see things work.

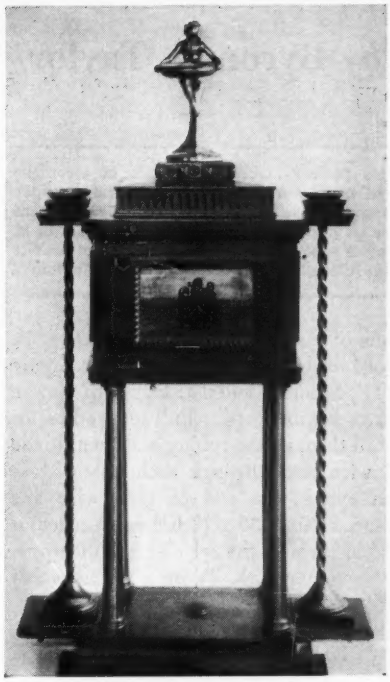
The molding used may be procured from any of the firms specializing in the manufacturing of furniture molding, or most of them can be made in the school shop.

A coat of boiled linseed oil may be applied as a filler and to bring out the grain of the wood. This should dry for at least 24 hours and then any raised parts of the grain should be sanded smooth. Two coats of shellac should be used, rubbed down with fine worn sand paper after each coat, followed by several coats of varnish, either clear gloss or dull finish. Any decalcomania transfer could be used for the door. The one used here is a coat of arms. The statue mounted on the top and the brass trays for the auxiliary smoking stands may be procured at an antique, novelty, or chain store. The small brass trays for the removable ash receiving stands may be made in the shop from two pieces of brass which are first shaped and then brazed together. The top part may either be hammered to the dish shape or it may be spun on a lathe by first cutting its shape in a wood block, fastening the brass over the opening, and spinning the brass to this shape.

The utility and attractiveness of this project makes it appealing to students interested in woodworking and desirous of creating a beautiful, unusual, and worthwhile piece of cabinet work.

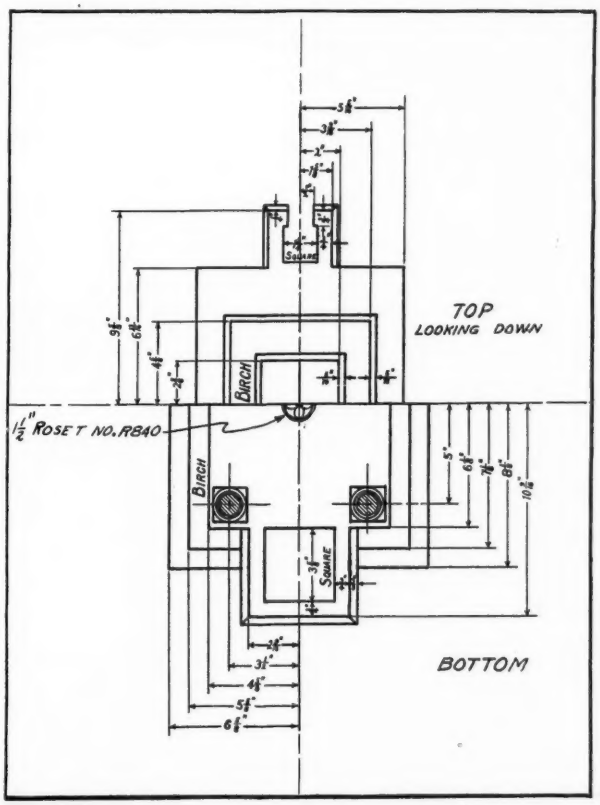
Detail of door-opening mechanism.

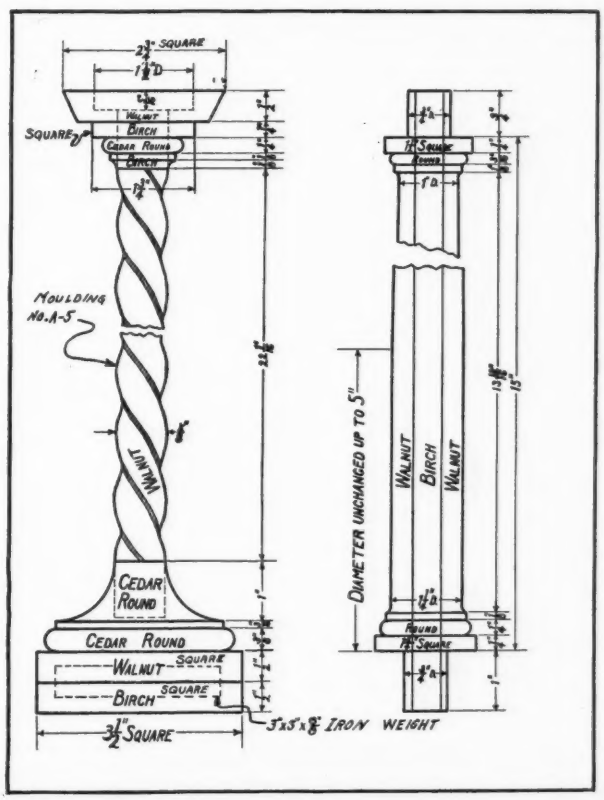




Below, left—Section half plan.

Below, right—Detail of columns.





✦ In an article in the *Southern Lumberman*, it is stated by J. L. Sterns that wood soaked one week per inch of thickness in a saturated water solution of urea (one pound of urea per pint of water) may be bent readily at any future time by merely heating it to 175° F. The chemical principle underlying this procedure is that urea reacts with lignin to give a thermoplastic. "Urea-treated lumber is more resistant to decay than untreated stock and in drying it definitely reduces the tendency to check," according to the article.

Heat Pencil *by* Byron M. Taylor

This project involves elements of electricity and metal-working, affording teaching opportunities in the first field particularly. The completed project is useful in craft classes. B. M. Taylor teaches electricity in the Woodrow Wilson Junior High School, San Diego, California.

A HEAT pencil or pyrograph has many uses around most any workshop for burning designs on wood, leather, plastics, etc.

Most pyrographs do not furnish sufficient heat for much of the work attempted with them; also they have a bad habit of burning out the element. To repair them is almost impossible. These difficulties led to the design of the heat pencil herein described. It is simple, easy to construct and repair, and furnishes plenty of heat—25 watts. If it is wound for use on six volts, it will burn out seldom, if ever. It will run on either a 6-volt storage battery or on a transformer (not less than 25 watt).

First, obtain a piece of fiber or bakelite tubing 3/8" O.D., 1/16" walls, 4½" long. Thread one end back about ¼" using 3/8" USS dies. Next, cut a disk of 1/8" sheet fiber or bakelite 1½" in diameter and shape and bore the holes as shown in Figure 3. Tap the center hole with a 3/8" USS tap. Screw the disk onto the tubing very tight. Remove any of the tubing that extends through the disk. Next, bore 1/8" holes through the tubing just in back of the disk and in line with the vertical center line of Figure 3. These holes carry the cord leads out of the tubing (see Figure 1). Secure a suitable length of No. 20 extra flexible cord. Pull one end of the cord through the tubing and then thread a wire back through each hole. Make an eye in the end of each wire and place a No. 4-36 x 1" RH brass machine screw through the eye and into the upper hole in the disk. Tighten the assembly with a nut; likewise in the bottom part. In this case use a machine screw only ½" long.

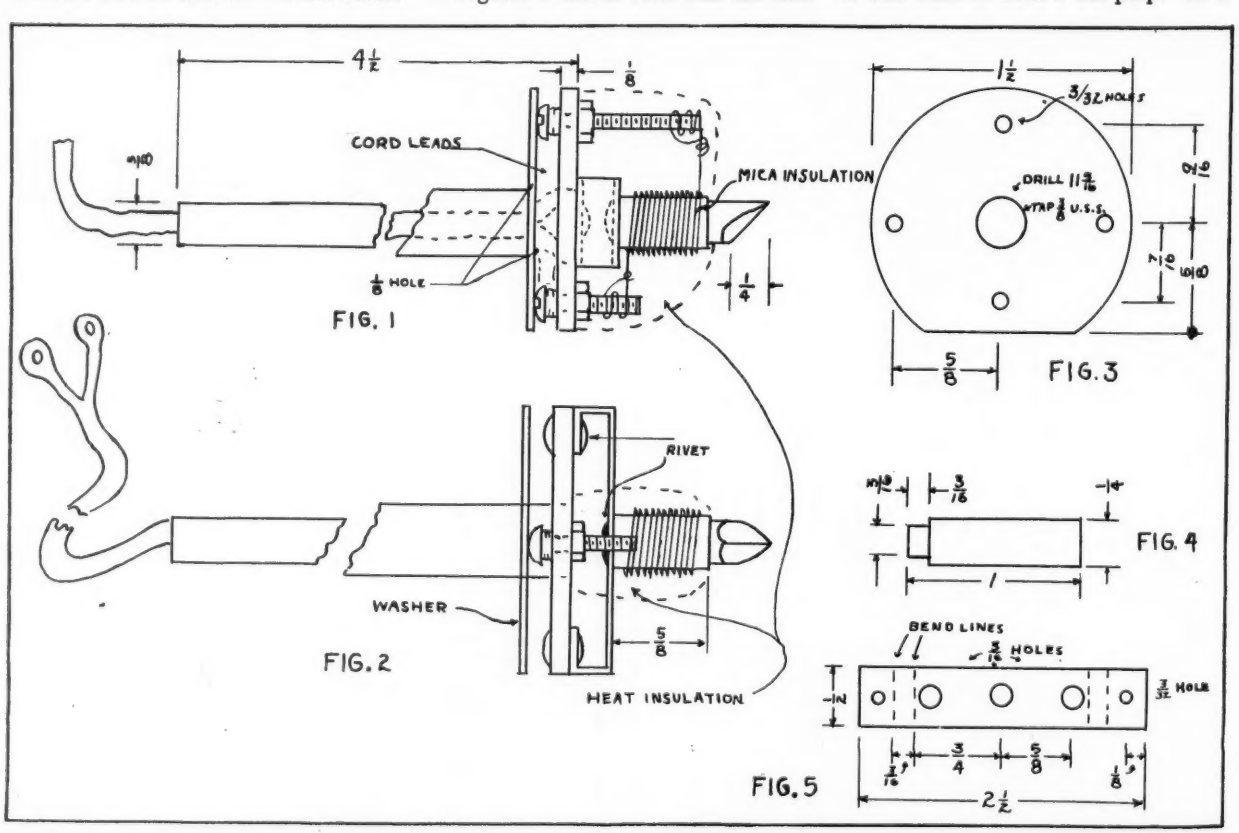
Cut a piece of ¼" diameter iron rod 1" long and shape the ends as shown in Figures 4, 1, and 2. If you do not have access to a lathe you may turn down the rod by placing it in a drill chuck and holding a file against the rotating rod. Now, cut a piece of 18-gauge sheet steel ½" x 2½". Bore the holes as shown in Figure 5 and shape according to Figures 5 and 1. Note that the ends of the strip bend back and under so that the 3/32" holes are in line with the two outer 3/16" holes. Rivet the rod securely through the center hole of the strip.

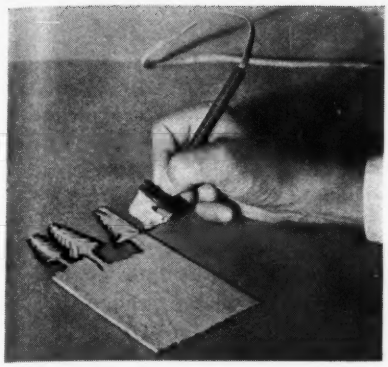
Now you are ready to fasten the scribe assembly to the handle assembly. Pass two 3/32" x ¼" soft aluminum rivets through the 3/16" holes first then through the 3/32" holes in the strip and the disk and rivet tightly.

Next, get a small quantity of uncut sheet mica. This is the same condition in which it comes from the mine with no binder. It will flake into sheets about .005" thick. Cut a piece 5/8" x 3" and wrap it around the rod as shown in Figure 1. Tie temporarily with a piece of twine.

For the heating element cut a piece of No. 24 nichrome wire 10" long. Wrap 1" in the threads of the bottom machine screw and secure it by doubling it back on itself (see figure 1). Now wrap the wire tightly about the mica, in the same direction as the mica was wrapped about the rod, until about 1½" is left. This will leave about 1" to be wrapped and tied about the upper machine screw. (Pull the wire tight until the screw is bent slightly down.)

A good heat, and electrical, insulation may be made by shredding a small amount of asbestos paper and mixing it with water to form a wet pulp. As a





binder, mix in an equal amount of Portland cement until the mixture is rather thick. Then it is pressed over the pencil in the outline shown in Figures 1 and 2 and by the photograph. It may be shaped and smoothed by wetting the fingers and passing them over the composition. Several hours will be necessary for the insulation to set and dry.

As a further insulation, cut a washer of 20 gauge fishpaper 1½" in diameter. Cut it to the outline of the fiber disk and then punch a ⅜" hole in the center. Now slip this washer over cord and tubing as seen in Figures 1 and 2.

In operation, the pencil is well balanced, heats rapidly, and will burn into quite heavy woods. However, basswood is to be preferred.

In case you wish a pencil that will run on 110 volts, all construction details will be the same except that you will need 7' of No. 40 nichrome wire. This will require several layers on the element coil. Separate the layers by inserting a strip of the sheet mica between the layers of wire.

Inexpensive Midget Racing Car

(Continued from page 6)

race. In case an odd number of cars are entered, the judges may run two or four cars in a single race to determine the winner.

Second Event—Grand Free-for-All

After running off the first general race, all cars will be started and the heats run off until some one car has won three heats. The winner here shall be known as winner of the "Grand Free-for-All."

Third Event—Speed Classic

This race will be run against time. Power here is unlimited. Each car is to make three runs and will be accurately timed. Entries will make one run each, and the runs repeated in order until all have completed the trials. The car attaining the greatest speed will be declared the winner.

Fourth Event—Driving Skill Race

This race is to determine the most skillful driver. Targets will be placed on the finish line, and cars are to be driven between them. Each driver may have three trials in order. Targets will be placed eight feet apart for the first trial, seven feet for the second, and six feet for the third. Power here is unlimited. Cars must pass between the targets without touching either. The driver making the greatest number of clear scores will be declared the winner.

Fifth Event—The Jump

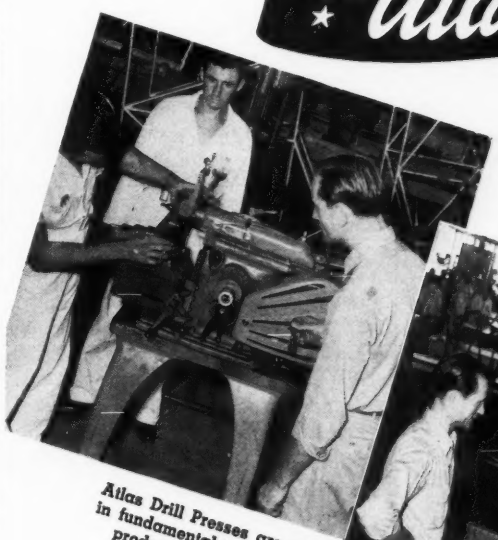
The purpose of this event is to drive the car at high speed up an inclined plane and jump an imaginary barrier, landing as far from the high side of the plane as possible. Mats will be provided for landings. Power here is unlimited.

Note: In case of accidents or ties, the judges shall decide when races or final heats shall be rerun. All decisions of the judges shall be final.

When it is realized that the plastics industry has reached the stage where it consists of an annual business of $500,000,000, the reason for including plastics in the school-shop program becomes more apparent.

How ★ Atlas SERVES THE NATION

One in a series of messages showing how Atlas helps in the Defense Program.



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Teaching the Functions of Alloying Elements

by Marshall L. Byrn

Assistant Professor of Vocational Education, University of Michigan

ONE of the most important and vital tendencies in industrial arts teaching today is that of content enrichment. This graphic representation of common alloy elements and their functions in making various types of steels was compiled with this end in view. It has been checked carefully by a metallurgist for a large manufacturer of ball bearings.

The chart has proven helpful in teaching metalwork and automechanics as it helps to organize and make more definite instruction in these subjects and greatly shortens the time required to gain an understanding of the reasons for using certain types of steel in the construction of automobiles, tools, and the more common products of industry.

The statement is sometimes made that this is indeed the "iron age." Another person might reply that this is no longer an iron age, but the age of steel. As a matter of fact, we are today living in an age in which both iron and steel play a very important part in industry and in our everyday life. It is a very rare occurrence to see a car or truck held up on the highways these days because of a broken axle, driveshaft, or connecting rod. The main reason for this is the great advancement the science of metallurgy has made in the last two decades in developing new types of alloy steels having a very high resistance to torsional vibration and continuous shock to which automotive and other machine parts are subject.

Long life and trouble-free performance are built into every type of machine in use today, from the largest press used in industry to the sewing machine in the home or the drills used by the dentist. Practically every piece of farm machinery of today is greatly improved over that of a relatively few years ago, even to the cast iron used because of the vast amount of research done by metallurgists and engineers in their never-ending search for finer and more suitable metals to perform the multitude of varied tasks imposed on modern machinery and tools.

Nowhere is the use of alloys more vital than in the building of the vast number of fighting machines the government needs for the defense of our country. Airplanes, tanks, submarines, battleships, and the entire array of smaller arms are all dependent for their efficiency on alloys of aluminum, steel, and cast iron. This, then is the age of alloys and not the "iron age" or the "age of steel."

In school shops, thoughtful and thorough instructors are not content "just to have the boys make something." To be sure, that is important. But another function of industrial arts and vocational instruction of equally great importance is to give the pupils a fine background of pertinent, fundamental knowledge of the various types of metals used in the shop in order that they may perform far more effectively the necessary tool and machine operations required to do the job at hand. The knowledge aspect should, I believe, be emphasized fully as much as the manipulative. This, of course, should hold for the woodshop, the electric shop, the auto shop, and all other phases of shopwork, the same as for metalwork.

Knowledge is the basis for all successful achievement in the school shop. In the auto shop or in any type of metal shop, be it machine shop, foundry, or a shop specializing in hand-tool operations, there is a most urgent need for a considerable fund of practical knowledge of the metals dealt with. To work with the tools of the trade as well as with various metals without an understanding of their composition, characteristics, and properties is to work in the dark.

To say that the boys come into the shop to work and not to use books is the subterfuge of the poor teacher and the

COMMON ALLOYING ELEMENTS
and
Characteristics They Impart to Steel

	CARBON	CHROMIUM*	NICKEL	VANADIUM	TUNGSTEN	MOLYBDENUM	MANGANESE	SILICON	COBALT
Hardness	●						●		
Hardness Penetration		●			●	●	●	●	●
Red Hardness				●	●	●			●
Oil Hardening Properties	●	●					●		
Strength Toughness	●	●	●			●		●	
Wear Resistance	●	●	●		●	●			
Refines Grain			●	●	●	●			
Cleans Metal in Melting				●			●	●	
Lowers Critical Temperature	●		●				●		
Raises Critical Temperature		●			●				●
Facilitates Rolling & Hot Working							●	●	

Legend:

● indicates to a considerable degree
● indicates to a very high degree

* Chromium also greatly increases acid resistance. Used in making stainless steel cutlery, sheet steel, and stainless balls.

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unprepared instructor. The only workman who can work to good advantage with metals is the one who understands them best. Time spent in learning to understand the materials with which a pupil works is, perhaps the most important time spent in the shop. The time spent in using study-guides to grasp fundamental knowledge of metals, their characteristics and heat treatment —in the case of tool steels—will more than be made up in the facility with which pupils can accomplish their shop tasks. Then, too, any intelligent pupil can soon be led to get just as much thrill out of mastery of subject matter necessary to do the job as in doing the job itself. This, of course, depends on the preparation, interest, and enthusiasm of the instructor.

A new joy in teaching awaits any teacher who will honestly endeavor to raise his shopwork above the category of busy work by placing greater emphasis on giving his pupils a better background of fascinating technical training pertinent to the work being done. He will also have the everlasting thanks of his students when they enter college or go to work in industry.

The accompanying chart giving the more common alloying elements and characteristics they impart to steel was compiled from several sources including the *National Metals Handbook*, Mark's *Mechanical Engineers Handbook*, Kent's *Mechanical Engineers Handbook*, the *A.B.C. of Iron and Steel*, as well as from several booklets put out by companies producing alloy steels.

A most excellent reference for the study of steel is *Tool Steel Simplified*, published by Carpenter Steel Co., Reading, Pa., and written by F. R. Palmer. While this book was not used in preparing the chart, the information found therein agrees with that found in this compilation.

Printing Teachers Form New Organization

The National Association for Printing Education is a new organization for printing teachers founded recently by leaders in this field who constitute the N. A. P. E. Committee for Organization. According to Harold E. Sanger, of the Chicago School of Printing and Lithography, executive secretary of the committee, the new society is to provide a professional "share your knowledge" group similar to the Printing House Craftsmen.

R. Randolph Karch, of the Cincinnati Printing High School, is Director of Publications and Floyd C. Larson, Menominee, Mich., schools, assistant Publications Director and editor of the *National Printing Education Journal*, official N. A. P. E. monthly magazine.

Other members of the organization committee are: Fred W. Miller, Masonic School of Printing, Fort Worth, Texas; Ward W. Swain, Washington Vocational School, Pittsburgh, Pa.; Harold G. Crankshaw, Central High School, Washington, D.C.; Ralph T. Bishop, State College of Education, Greeley, Colo.; Allison J. McNay, Dorsey High School, Los Angeles, Calif.; Leroy Brewington, State Teachers College, Pittsburg, Kan.; Harold H. Kirk, Langley Junior High School, Washington, D.C.; William R. Baker, Stout Institute, Menominee, Wis.; and John C. Tranbarger, State Teachers College, Terre Haute, Ind.

Officers of the association will be elected in May, 1942, and installed at the annual convention of the N. A. P. E. in August.

N. P. A. E. will also sponsor a Student Honor Division, headed by Harold Kirk.

Membership fee for the N. A. P. E. is $1.00 per year, and may be mailed to Harold E. Sanger, 610 S. Federal St., Chicago.

Instructional Resources

Inquiries concerning materials described in these columns may be addressed to SCHOOL SHOP, Box 100, Ann Arbor, Mich., and will be passed on to the proper firm or person.

Books

Projects in Electricity. M. D. Collings. Bloomington: McKnight & McKnight, 1941. Pp. 80. $1.00.

A discussion of materials, methods, and elementary principles of electrical construction, as applied to buzzers, motors, the telegraph, etc. Beginning with chapter VII, 21 projects are given, ranging in complexity from a low-frequency single-coil buzzer to a four-pole motor.

Merle D. Collings teaches industrial arts in the Indianapolis, Ind., public schools.

How to Plan a School Workshop. Milwaukee: Delta Manufacturing Co.

Floor plans for school workshops in all parts of the country, chosen from entries in a floor-plan contest. Each plan is accompanied by a photograph of the shop in use. Information also on how to arrange woodworking machinery to best advantage; cross-section paper and plan drawings of machines for laying out on paper the best shop arrangement for individual schools. Write Delta Manufacturing Co., 675 E. Vienna Ave., Milwaukee, Wis.

Wood Patternmaking. Herbert J. McCaslin. New York: McGraw-Hill Book Company, Inc., 1941 (third edition). Pp. xxvi + 339. $2.25.

Part I deals with bench work: a discussion of the materials and tools used, a series of bench jobs, and questions using this information. Part II deals with lathe work: tools and techniques, lathe jobs, and patterns of increasing complexity, with questions. Glossary of patternmaking terms; index; diagrams throughout text.

Herbert J. McCaslin is instructor in patternmaking, industrial department, Dickinson High School, Jersey City, N.J.

A Good Mechanic Seldom Gets Hurt. H. R. Graman. Chicago: American Technical Society, 1942. Pp. x + 94 (Paper; coil bound). $ .50.

A complete illustrated handbook on machine-shop safety, covering under separate headings safety practices for each phase of machine work—hand tools, grinding, material handling, lathe work, etc. Concludes with six pages of questions on shop safety as discussed in the book.

Herman R. Graman is machine-shop instructor and assistant supervisor of National Defense Training at Parker Vocational High School, Dayton, Ohio.

Basic Units in Mechanical Drawing. Vol. 1. Hoelscher and Mays. New York: John Wiley & Sons, Inc., 1941 (second edition). Pp. x + 305. $1.60.

In two parts of 17 units each, each unit with questions and problems. Begins with discussion of use of tools and materials, lettering, and goes on into increasingly complex forms of drawing. Index.

R. P. Hoelscher is professor of engineering drawing at University of Illinois, and A. B. Mays is professor of industrial education at the same institution.

Airplane Maintenance. H. G. Lesley. New York: John Wiley & Sons, Inc., 1940. Pp. xi + 511. $2.75.

Intended primarily as a text and reference book for airline employees, operators of repair stations for airplanes, and for private airplane owners, this book is also a useful source of information for teachers and students of airplane construction, mechanics, and maintenance. Chapters of the book are devoted to maintenance, materials and processes, controls, hydraulics, electrical circuits, structural repairs, aircraft welding, de-icing equipment, instruments, fuel and oil systems, heating systems, and vibration. Explanations are rather complete for a book of this scope; illustrated with halftones and diagrams; indexed.

H. G. Lesley, B.S., is maintenance engineer for Eastern Airlines, Inc.

Fifty Hints for Teachers of Vocational Subjects. M. R. Bass. Chicago: American Technical Society, 1941. Pp. v + 58 (Paper covers). $ .50.

Succinct advice, interestingly presented, for the teacher of industrial subjects. This advice is classified under appropriate headings: the teacher, his personality and student relationships; advisable techniques in teaching; management of classes and organization; checking up on oneself.

M. Reed Bass is director of the Ranken School of Mechanical Trades in St. Louis and member of the Editorial Advisory Board of SCHOOL SHOP.

Hobby Crafts series. Chicago Public Schools, Bureau of Curriculum. Forty cents each. Mimeographed; paper covers.

This series deals with the craft work in Chicago schools. The first discusses the craft clubs themselves [see SCHOOL SHOP, I (October, 1941), 10], and the others are devoted to individual crafts: ceramics, leatherwork, metalwork, and woodcraft. Each book is complete with information about tools and materials, projects, and processes and methods. Bibliographies are sometimes included.

The Starrett Book for Student Machinists. Athol, Mass.: L. S. Starrett Company, 1941 (revised edition). Pp. 184. $ .75.

In this revised edition of the *Starrett Book*, the two previous volumes, the book for machinist apprentices and the data book for machinists, have been combined into one. Contains illustrated material on: how to read working drawings; how to make measurements; fitting; bench work; use of hack saws and drills; lathe work; screw threads; tool making; and a number of additional phases of machine shop work. Index, reference tables, and numerous drawings and photographs.

Short Talks on Wood. Beloit, Wis.: Yates-American Machine Co. No charge.

A series of cards, each with a short discussion of a wood used in woodworking. Information about the wood, its uses, and the tree from which it comes, where the tree is found, etc. Address Yates-American Machine Co., Beloit, Wis.

Bricklaying: An Analysis of the Trade . . . George A. McGarvey. Washington: U. S. Office of Education, 1941. Pp. xiv + 238. $ .40 (order from Superintendent of Documents, Washington, D.C.).

A thorough survey of bricklaying as one phase of vocational education. Section I deals with developing, organizing, and financing an apprentice-training program; section II, a classified analysis of the trade; section III, courses of instruction and training; and section IV, suggestions to instructors. Considerable instructional material about the trade is given, together with sample job-instruction sheets. Well illustrated with color and black and white halftones, drawings, and diagrams. Five appendices. George A. McGarvey is an agent in the Trade and Industrial Service, Office of Education, Washington, D.C.

Turret Lathe Operator's Manual. Cleveland: Warner & Swasey Co., 1941. Pp. 240. $1.00.

A clearly-written manual on all phases of turret lathe operation and metal turning. Explains methods and short-cuts. Over 350 illustrations and drawings; tables on feeds, threads, speeds, tool angles.

Films

Power for Defense and **Army in Overalls.** Division of Information, Office for Emergency Management. Washington, D.C. Each 1 reel, 10 and seven minutes respectively.

Power for Defense reports defense activities using TVA power: making of army shoes, tents, textiles, shells, aluminum, etc. *Army in Overalls* deals with work of the CCC in clearing military reservations for the U.S. Army. Film shows land clearance for parachute troop training, tank units, rifle ranges, and other activities.

No charge beyond transportation costs is made for the use of these films. Bookings may be obtained through several depositories listed on *Information Sheet on Defense Motion Pictures*, obtainable from the Division of Information, Office for Emergency Management, Washington, D.C.

Tests

Drawing Aptitude Test. Weston W. Mitchell. Bloomington: McKnight & McKnight, 1940. $.10, with manual of directions and answer key.

The student is asked to recognize the several surfaces of a solid when presented in top, side, and front views, and vice versa. Weston W. Mitchell teaches mechanical drawing at Central High School, Minneapolis, Minn.

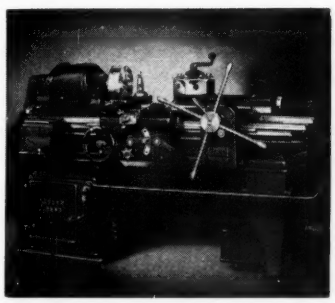
Please mention SCHOOL SHOP when writing for materials and equipment described above.

NEWS FROM
industry

For items listed in this column, readers may address the firm named or write to News from Industry Dept., SCHOOL SHOP, Box 100, Ann Arbor, Michigan.

New South Bend Lathe Announced

A new 16" swing turret lathe designed for rapid production on chucking operations and bar work has been announced by the South Bend Lathe Works. This new lathe has a 16¼" swing over bed ways and saddle wings, 9⅝" swing over tool post saddle cross slide, 1⅜" hole through headstock spindle, and 1" capacity through the collet.



The ram type turret has both power and hand feed, with automatic indexing and individual stop for the six turret faces. Forty-eight changes of turret power feeds, and a like number of changes of cross and longitudinal feeds for tool post carriage are possible, as well as a series of 48 screw threads, 4 to 224 per inch.

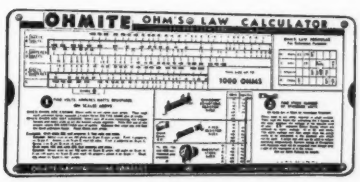
Complete information can be obtained from South Bend Lathe Works, Dept. S5, South Bend, Ind.

New Technical Education Paper for Teachers

McGraw-Hill Book Company, Inc., announces the publication of the *Technical Education News*, containing technical items and news of interest to teachers in technical institutes, terminal junior colleges, and defense-training courses. Vol. 1, No. 1, appeared in August. Teachers in the above fields may receive *Technical Education News* without charge by addressing McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York, N. Y.

Handy Ohm's Law Calculator

A unique Ohm's Law calculator especially designed by the Ohmite Manufacturing Company, Chicago, is being offered for ten cents to cover handling costs. The calculator gives the answer by direct reading for any Ohm's Law problem, as well as being designed to perform multiplication, division, and the finding of squares and square roots. No slide-rule knowledge is needed.



Scales on two sides cover the range of currents, resistances, wattages, and voltages commonly used in industrial, electronic, and radio work. They cover the current and wattage range for motors, generators, lamps, and electrical apparatus up to 100 amperes or 1000 watts.

The calculator also has a stock unit selector, listing hundreds of stock values in Ohmite Dividohms, fixed resistors (including Ohmite Brown Devils), and rheostats.

Address Ohmite Manufacturing Company, 4935 Flournoy St., Chicago, Ill.

Gluing "Textbook"

The Casein Company of America, 350 Madison Ave., New York City, is offering a 36-page illustrated book covering the use of its glues. Includes mixing directions, setting times, and information about veneering, overlaying, and inlaying. Ask for *Casco Gluing Guide.*

New Catalog of Furniture Hardware

Thurston Supply Co. is offering a new 1942 catalog of furniture hardware and devices. Address Thurston Supply Co., Anoka, Minn.

"Trouble Shooter" for Automobiles

Champ-Items, Inc., St. Louis, Mo., is offering without charge a 72-page booklet, "Cures for Motor Car Ailments." Short-cut ideas, illustrated, for auto service problems.

IN THE *Morning Mail*

● Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Mich.

Gentlemen:

. . . I wish to congratulate you on your new publication. This first issue was "packed" with useful and up-to-the-minute material. I read it from cover to cover without omitting a sentence. I wish you success in your publication.

HAROLD J. BAUMAN, Head
Dept. of Trade and Industrial Education
Port Huron, Mich., Public Schools

Gentlemen:

May I take this opportunity to congratulate you on your first edition of SCHOOL SHOP. I agree with you that there is a great need for a magazine of the type of SCHOOL SHOP. Your first edition had a nice balance of projects and articles, which I believe is essential to best serve the needs of the men in the field. All our teachers were enthusiastic concerning SCHOOL SHOP.

C. W. COONS, Director
Vocational Education
Greenville, S. C., High School

Gentlemen:

Your new magazine has just come to my attention, and I like both the format and the contents. Please enter my subscription and begin with the first issue if possible since I intend to become a permanent subscriber and wish to have a complete file. Best of luck with your venture

E. BURNHAM DUNTON
Asst. Prof. of Industrial Arts
Teachers College of Connecticut
New Britain, Conn.

Gentlemen:

May I extend you my sincere congratulations on the issue of the first number of SCHOOL SHOP—a publication which is needed in our teaching field. Vol. 1, No. 1 is a dandy start in the right direction—the articles and project suggestions are good, the makeup of the entire magazine is above average. I wish you success in this publication venture.

J. LYMAN GOLDSMITH
Supervisor
Elementary School Industrial Arts
Los Angeles, Calif., Schools

» City Directors «

SCHOOL SHOP has made every effort to check its mailing list for accuracy. Each shop teacher is entitled to a copy of SCHOOL SHOP (see notice on inside front cover). As a further check, it would be appreciated if you would send to the Circulation Department the names and school addresses, along with subject taught, of each of your shop teachers. Your cooperation in this regard will be much appreciated.

CIRCULATION DEPARTMENT

School Shop

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What Do You Think?

On what should semester marks be based?

▸ Says Ernest K. Gackenbach, High School, State College, Pennsylvania:

More than the mark of a finished project or a term paper should be considered in the semester mark if we are to care for individual differences, aptitudes, and personalities. Such variations in pupils as mental age, chronological age, previous experience, interests, adaptability, and physical, mental, and social differences must be considered.

Only through direct contact with the pupil in individual instruction and personal conferences can information be secured necessary to measure his progress in achievement as compared to his ability and personality. Industry is more concerned with personalities than with marks. Report cards in industry are in the form of check lists. From this check list of skills and personalities, the worker may be pictured and placed in the job suited to him. Does not the slow but thorough worker have a chance as well as the quick but perhaps less accurate production worker; and does not the spontaneous but otherwise excellent worker have his possibilities?

Why do we not mark a pupil with a descriptive report rather than the conventional *A* or "Excellent," and the *E* or "Absolute Failure"? Give the pupil recognition for that which he can do well. On this trait may arise a genius of tomorrow, if properly recognized and encouraged.

▸ Says R. H. Roberts, Central High School, Tulsa, Oklahoma, and former Director of Industrial Arts, Winfield, Kansas, Public Schools:

The items listed here are the most important ones on which the semester marks of the Winfield Junior-Senior High industrial arts students are based. These will be found to require both teacher judgment and scientific testing.

1. What progress has the student made in acquiring the manipulative skills involved in the courses?
2. What progress has he made in his ability to plan and organize his work to secure the best results?
3. Does he use his time profitably?
4. Does he acquire the necessary information concerning the working tools of his course to enable him to make reasonable progress in his work?
5. Does he cooperate with his instructor and the other members of his group and act the part of a good citizen in all of his relationship with his school?
6. Is he anxious to receive instruction?
7. Does he show a reasonable amount of self-reliance?
8. Does he accept responsibility?
9. Is he neat and accurate in his work?
10. Does he show a proper respect for the tools with which he works and a reasonable pride in keeping these tools in good working condition?
12. Does he select the type of project that will challenge his best efforts or does he prefer to perform those manipulative processes that are easy for him and that involve very little new experience for him?
13. Is he prompt and regular in attendance?

▸ Says Robert E. Smith, Professor of Industrial Arts Education, the Ohio State University:

Quality and quantity of work accomplished plus regularity of attendance have generally been the bases of awarding semester marks for work done in industrial arts. Furthermore, these awards have been made on the basis of what the average student could accomplish in the course of a semester. This practice disregards the factors of individual difference and of previous experience and background. Quality and quantity of work are important factors and may reflect many other attributes which are of greater significance than the thing or quantity produced, for example, accuracy, neatness, carefulness, persistence and effort, and, under desirable teaching conditions, ability to plan, create, and proceed independently. If development of all of these attributes was given optimal emphasis in awarding semester rewards, on the basis of quality and quantity of work produced, a decidedly broader and more adequate basis of grading would be established than is now current. But, even a base embodying all of these features is not sufficiently broad.

When prospective employers are asked what they expect of school leavers and graduates entering their service, they invariably specify the attributes mentioned above and in addition, ability to work harmoniously with other people, be dependable and punctual, have the right attitude toward work, do an honest job of work and an honest day's work. The significance of personality traits in relation to vocational success is further emphasized by the findings of a number of researches, made over a period of years, which reveal that between 60 and 70 percent of employees who lose their jobs, lose them because of some personality deficiency rather than of inability to do the work for which they were employed.

The frequently heard expression of employers in regard to qualities desired in junior employees, plus the findings of research, clearly indicate the importance of development of desirable personal social traits. No activity that the school sponsors offers a better opportunity or more favorable environment for developing the attributes mentioned above than does the area of industrial arts. Since development of desirable personal social traits and attitudes is essential to success in one's life work, it follows that the school staff should by every reasonable means stimulate students to achievement of this goal. Extending the base on which semester awards are made to include development of the intangible factors of personality, plus the quality and quantity of work, would seem a more adequate basis for awarding semester marks and be a means of definitely stimulating students in the direction desired. Employees who can get along with other people and have the right attitude towards work often are satisfactory workers even though lacking in accuracy or cerain specific skills. The converse is rarely true.

Establishment of semester marks on this broader basis will require the use of devices other than those now commonly employed by teachers of industrial arts. The devices most commonly used for rating personality or trait development are recorded observations and anecdotal records. The results obtained from the application of these, plus evaluation of the laboratory and class work, will give a more complete profile of an individual's total growth and development than will mere evaluation of mastery of subject matter.

▸ Says Burl N. Osborn, Professor of Industrial Arts, State Teachers College, Millersville, Pennsylvania:

No doubt every teacher has had the experience of having pupils ask, after grades cards were issued, "Mr. Smith, why did you give me a *C*?" This type of question is good evidence of the fact that it is impossible to boil down all the elements of personal growth achieved by a pupil into a single letter or figure. Even worse is the realization that fateful decisions of the pupil's future are based on this single index.

The primary basis of a grade is a clear-cut statement of what the teacher and pupil are trying to accomplish. Without this guide (which can never be exactly the same for any two people) no grade has significance.

Individual growth toward certain goals cannot be measured unless the goals are known. Once these are clearly stated, many techniques of evaluation are needed. An index of progress can be most effective when it is a descriptive statement, rather than a letter. The move to eliminate grades and substitute the descriptive report is an improvement in that the learner may better know wherein he is successful and how he should direct his efforts toward improvement. Even when this form of card is not used, it is wise for the teacher to keep some anecdotal record of each pupil. However, all of this procedure must be based on a statement of purpose which (to repeat) is an individual matter.

▸ Says J. Howard Waddell, Calvin Coolidge High School, Washington, D. C.:

Semester marks should be based on the student's accomplishments in the subject plus his attitude toward the work and cooperation in the class.

Points to consider:

1. Planning the work and adhering to the plan. The student should think through the job to be done, arrange the work into definite steps and set them down in some logical order, then make an effort to follow the work as planned.
2. Proper care and use of tools and equipment. Keeping tools sharp and in good condition, using them according to correct procedure, and storing them in their proper place.
3. Cooperation in class personnel duties.
4. Attitude toward and effort put into the work.

5. Workmanship. Quality and quantity of work on projects. (A special form may be used for rating projects.)

6. Related information. This may be in the form of a workbook, notebook, tests, etc.

A chart of these points may facilitate pupil rating.

Says R. L. Dragoo, teacher of radio, Samuel Gompers Trades School, San Francisco, California:

1. Most basic, should we have such marks? This school does not, except for high-school people who are marked on one basis: is the job done and how well?

2. With the idea in mind of using no marks, a good workable plan lies in giving so-called marks of "average" or "superior" a year or more after the student enters his field of work and proves the worth of his training.

3. From the teacher's viewpoint, why not come down to earth and mark people, if forced, on the basis of the actual job we have done in giving each student the benefit of our knowledge and skill and the general degree of advancement he has made toward use of these skills in getting and holding a job in real life after graduation. In other words, will employers call on you for students, do you place your boys in jobs, do they stick, do they advance, are they a credit to you?

Says Rocton Bowker, teacher of woodworking, Tilden Technical High School, Chicago, Illinois:

We at Tilden have adopted a rather liberal policy as to semester marks. The majority of my students are beginners with very little experience and need encouragment. We have frank discussions as to how good marks are obtained. We are trying to build character and correct thinking as well as physical skills. We base our marks on attention, attitudes, dependability, honesty of effort, as well as the finished product.

Says Raymond Cherry, Professor of Industrial Arts, State Teachers College, Wayne, Nebraska:

Much has been said and printed about grading in industrial arts. Most of us do not take the time to arrive at a fair estimate for the semester marks, or we fail to find some satisfactory criteria to follow in determining them. Many shop teachers fail to give tests and base their marks wholly on the finished projects. If a subject is worthy of a place in the school curriculum, it is certainly worth the time and effort needed to give a test that is valid. Such a test should be given if for no other reason than to test the effectiveness of our own teaching.

Roughly speaking, we base our semester marks 50 percent on what the boy knows and 50 percent on what he can do. We can break down our bases of grading into a number of definite points. Before listing these points, I assume that the shop teacher has analyzed his subject and has listed the things he wishes to teach. This should include what the boy should know and the skills he should acquire in taking the prescribed course.

The following points should be considered in making out the semester marks:

1. Various types of objective tests. They should cover the related information and the things the boy should know.

2. Performance tests. They should test skills and be given several times during the semester in order to show the rate of improvement.

3. Ability to plan. Since this is one of the main objectives in shop work, it should be given special attention in determining marks.

4. Can the boy assume responsibilities? We include the care of tools and machines, certain routine duties such as cleaning up at the end of the period and putting away his work, and special duties such as shop foreman, etc.

5. The finished project. This is graded on the workmanship and the time required to complete it. If it is not a standard shop project involving the things we wish to teach but rather an approved project of his own selection, we grade on originality, designing, usefulness, and workmanship.

Says O. A. Steinike, teacher of drafting, High School, Beaver Dam, Wisconsin:

I believe a semester grade should be an accumulative one. In our school system we use three letters: *H*, highly satisfactory, indicates superior work; *M*, moderately satisfactory, shows fair progress; and *U*, unsatisfactory, denotes lack of satisfactory progress. A list of descriptive characteristics for each mark is printed on the card to indicate to the student how the mark results.

In our shops, the quality of work, attitude in groups, initiative, and dependability are a few of the outstanding characteristics contributing to the semester grade. This system is only possible through a very complete guidance program in which each member of the faculty should have a thorough understanding of the characteristics of each student. This requires a complete record of educational progress from first grade up as well as personal data secured from the student, his parents, and other sources. The record should be properly filed and accessible to all faculty members.

Says Ross C. Cramlet, Iowa State Department of Education and former teacher in the Des Moines schools:

During the past few years considerable attention and interest has been centered on grade cards or reports to parents. The general trend of thinking among leaders in the field of education has been towards generalization or socialization of individual characteristics of the learner, while in some instances reports have been eliminated entirely. In many school systems personal qualities have been classified under a very general heading and the marks which indicate the degree to which an individual measures up to these characteristics are quite general in meaning; in fact, so much so that the student and the parent as well have difficulty in interpreting their meaning.

The basis of reasoning which justifies this modern trend is the effect of marks as related to individual complex. It is true that we have as much variation in individual temperaments as we have in individual appearances; however, we must not lost sight of those normal situations which the individual will face when he leaves school to find his place in society. He will find competition, opposition, lack of consideration on the part of others, and many other situations which will be the opposite from the protection he may have had while in the public school. Society will have little respect for his individualism. He will have to adapt his personality to fit the pattern of his environment, an idea which is more or less contrary to the theory that the modern education is designed to fit the needs of the individual.

At this time when personnel is such a big problem in the service of industry and all other social avenues, it would seem that we should consider seriously those traits of character which personnel directors are con-

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sidering and asking for, and set up in our shop organization training standards both for personality and skill similar to those asked for when our young people have completed their public school education. It is a serious thing when personnel agencies tend to disagree with public education and its standards.

The following characteristics which might be included on student rating sheets seem to occur most frequently in personnel questionnaires:

Health.
Good work habits.
Punctuality.
Honesty.
Initiative.
Willingness to cooperate with others.
Ability to take suggestions.
Ability to follow directions.
Respect for property and its relationship to people.
Basic skills.

It is true that the attempts of the instructor to judge the exact extent to which individuals may measure up to standards, is difficult and almost impossible. A rating standard, however, based on what an individual may normally expect when he leaves school, may make young men and women conscious of social and industrial standards, and prepare them in many cases to face actual situations without major adjustment.

▸ Says Nelson L. Burbank, Principal of the Taft School, Cincinnati, Ohio:

Semester marks should be based on the following factors:

1. Thorough acquaintance, by the teacher, of the child's adjustment from first entrance into the teacher's presence.
2. The accomplishments of each child, based not so much on the "average" of all within a group or room, but based on "how far" the child has gone from where he was when he began his studies under a particular teacher.
3. Granted that many elements in a school are so highly individual in character that such cannot be standardized, a fair or reasonable program of periodic tests should yield vital signs of achievement and permit a reasonable and unbiased grading, coupled with the foregoing "adjustments," and "how far" factors.

▸ Says J. C. Woodin, Supervisor of Industrial Education, Public Schools, Wichita, Kansas:

Personally I think the matter of giving marks by one human being to another is a question that deserves the most careful, earnest, and sincere thinking on the part of all of us. The problem presents a number of angles, one of which follows to show the difficulties which a shop teacher must face: Here are two boys, Bill and Jack. Bill comes from a wealthy home; he has a wonderful shop in his basement at home with all the latest type machinery. He has traveled over the country with his parents during the summer; he has visited veneer mills, cabinet shops, furniture factories, etc. Jack comes from a nearby farm; he has never had time or opportunity to hold even a plane in his hands but has always had a desire to work with woodworking tools. This gives you a picture of two boys working on the same or adjoining benches. During the first semester Bill does his work without very much effort, plays a lot of the time, bothers other students in the class, does not care to help anybody because he has been pampered, and does not feel the need to help anybody. At the same time Jack digs in, works hard, and produces a very unsightly, poorly constructed project. In other words, if the teacher lets the project interfere with his judgment of the trainee, you can very readily see that Bill will get a very high mark and Jack a very low one; but if the teacher considers the amount of real education that has taken place on the job, the amount of effort contributed to the making of the product, the advancement of the two boys from where they were at the beginning of the semester to where they are now, this will throw a very different light on the kind of semester mark each will receive.

▸ Says Walter E. Durbahn, teacher of vocational building trades, High School, Highland Park, Illinois:

The six-week or semester grades are an indication of the good or poor work performed by the student during the period. In industrial education, the work alone is not sufficient criteria upon which to base a grade. The student's attitude—toward his work, toward his fellow students, and his teacher as well as his willingness to cooperate, his tolerance and dependability—are factors too important to overlook. Rewards by the teacher through grades for the effort of students to develop these character traits will encourage good habit formation so essential in this industrial world. These habits, when combined with the skills and knowledges of a trade, will help to a great measure the individual to get and to hold a job as well as to be able to make adjustments in later life.

Personalities . . .

Now employed at Lockheed Aircraft Corporation, Burbank, Calif., are the following teachers: EMIL SANDOZ, Hood River, Ore.; RUSSELL PARMENTER, St. Helens, Ore.; RUSSELL WILLIAMSON, Turlock, Calif.; HAROLD MEIER, Corvallis, Ore.; and WILLIAM VANNICE, Haines, Ore. . . . WILLIAM J. DUNLOP, of Lewis and Clark High School, Spokane, Wash., has been promoted to head of industrial arts in that school. . . . MAURICE RICHARDS is a new member of the industrial arts staff of the Michigan State Normal College, Ypsilanti. . . . WILLIAM MACRAE GILLIES, noted commercial artist and type designer, has been added to the art staff of Frank Wiggins Trade School, Los Angeles, Calif. . . . BOB MIRUS is now instructor in industrial arts and coach at Neoga, Ill., high school. He is taking the place of RAY DUNCAN, who has gone to Martinsville, Ill., high school as industrial arts instructor. . . . ROBERT BARCLAY and L. CARCNINO have both taken positions at Hitchcock Junior High School, Galesburg, Ill., the former teaching mechanical drawing and the latter wood and metal work. . . . J. LYMAN GOLDSMITH, formerly electricity instructor at Bret Harte Junior High School, Los Angeles, has been made supervisor of industrial arts in charge of elementary schools. . . . ELLERY L. HUFF has replaced CHARLES ALLEN as manual training teacher at Traip Academy, Kittery, Me. CHARLES ALLEN now teaches at Sanford, Me., high school. . . . NORBERT YOUNG is now teaching industrial arts at Maine Central Institute, Pittsfield, Me. . . . JOHN F. SHEA is the new graphic arts instructor at Burr Junior High School, Hartford, Conn. . . . JOHN H. PICKUS has replaced JOHN LARSEN as instructor of electricity and drafting at Port Charles, N.Y., junior high school. . . . HARVEY KULIBERT replaces VERNOR H. COOK as drafting instructor at Ann Arbor, Mich., high school, COOK having accepted a commission in the U. S. Navy. Other new teachers in the Ann Arbor system are CALVIN FRAPPIER, teaching printing, metalworking, and woodworking at Slauson Junior High School, and OSCAR THORSEN, who has taken SVEN EKLUND's place at Slauson School. Eklund is now coordinator of apprentice training in the Ann Arbor schools. . . . ALEX DAWSON, formerly of Myrtle Point, Ore., public schools, now is coordinator of cooperative vocational-industrial program at Ontario, Ore. . . . PAUL R. BOWERS, formerly vice-principal of the Wasco, Calif., Union High School, is now principal of the new technical high school at Stockton, Calif.

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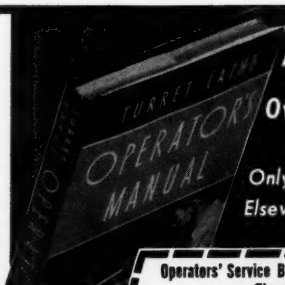

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MOVIES invade the MACHINE SHOP

how movies on lathe operation promote teaching efficiency in machine-shop courses

by Sherman B. Hagberg

ONE of the first classroom films ever made for machine shop training was produced at Rochester Athenaeum and Mechanics Institute in cooperation with the Teaching Films Division of the Eastman Kodak Company. Two 16 mm. sound films of a series on lathe work have been completed and are ready for distribution. This series is designed to assist in training young men as skilled mechanics for national defense work.

This series of sound films is expected to speed up mechanical training by permitting whole classes to watch the operation of machine tools "right over the shoulder of the operator" by means of motion-picture close-ups. Machine shop practice is standardized, making these films applicable to classroom demonstration anywhere in the United States.

At a time when some vocational schools are teaching classes in three shifts "right around the clock," the new motion pictures will contribute importantly to defense training by giving vocational teachers a means of making one phase of teaching more efficient.

The first reel covers the correct method for exact alignment of the lathe; the successive steps in facing, straight turning, and squaring a shoulder; accurate work to dimensions from a mechanical drawing; characteristics and selection of principal cutting tools; and the use of micrometers in relation to the graduated dials.

The second reel continues the fundamental instructions essential as a basis for satisfactory operation of the lathe. In a step-by-step performance it shows the many procedures leading up to, and involved in, simple boring.

The sound track of the film coordinates explanation with the course of the motion-picture demonstrations.

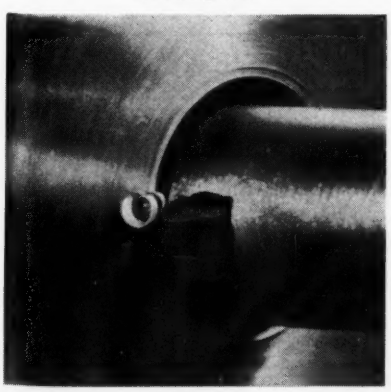
The mechanical operations demonstrated in these pictures were enacted at Rochester Athenaeum and Mechanics Institute, Rochester, New York. Teaching the operation of machinery requires three stages: (1) instruction by the teacher, (2) demonstration, and (3) actual operation by the students. It is in the demonstration stage that teaching films are most helpful, just as surgical motion pictures have given medical students unique opportunities to study operations from the camera's close-up positions at the surgeon's elbow.

These films have had enthusiastic reception at the Institute, where they have been in use for several months. Under its defense training program, now entering its second year, the Institute has given intensive shop work to 498 students. With 65 students in each class, it was found that the old method of demonstration was not successful. Through use of the film, students were given an unobstructed close-up view of the operation, where previously they had to stand on the edge of a crowd on tiptoe to peer past a succession of heads. As a result, students learned more quickly and more thoroughly.

An additional use is made of this film at the Institute. Each Monday a number of new students are accepted in the classes to fill vacancies created by other students leaving the school to go into industry. The picture has been found useful with these beginning groups, and affords the older students the opportunity of viewing the film again.

Lathe operation film being shown at Rochester Athenaeum and Mechanics Institute.

Close-up view of boring bar, showing action of cutting tool.



Sherman Hagberg is instructor in machine-shop practice at the Rochester (N. Y.) Athenaeum and Mechanics Institute. The Institute is a privately endowed, nonprofit technical institute. During the past year its total enrolment in day and evening courses was 4,565. The Institute's machine shop, one of the finest in the United States, has been in operation 24 hours a day since July, 1940. The increasing growth of visual education and the pressing need for machine operators in defense industries make this article very timely.

Washington Letter

by **Alan Murray**

WHEN the Duke of Wellington said, "The Battle of Waterloo was won on the playing fields of Eton," he made the most celebrated of all references to schools in relation to war. Conditions today would probably shock the Iron Duke profoundly. He would find that not officers but men—not gold braid and tassels but tanks and bombers—not cricket fields in private schools for little aristocrats but school shops in public education for all youth—will win or lose the present war.

There are still a good many iron dukes left in Washington, though they are popularly termed brass hats nowadays. In private and sometimes in public, they express their distaste for the newfangled notions of training now in effect. Particularly revolting to them are new army regulations providing comfortable uniforms and headgear for trainees, abolition of the system of saluting superior officers except when on military duty, and similar innovations which emphasize the importance of individual human beings and their needs.

● In active discussion behind the scenes are plans to furnish subsistence for those taking defense-training courses, much in the way the NYA and CCC pay their enrollees. Industrial needs in some communities require more trainees than can be obtained locally, though school and shop facilities are available. To bring students from other localities presents the problem of supporting them while in training.

Under its present program, the NYA offers a partial solution. Also, by turning over some of its camps exclusively to training, the CCC can be used. *But direct grants to school systems for subsistence purposes would be simpler, in the opinion of some observers, and it is this which is being suggested.*

● Industrial arts programs have suffered almost everywhere from a shortage of teachers, according to reports received in the nation's capital. Other teaching fields have been hit too, but not to the same extent. The lures are opportunities arising from the defense program for positions with greater incomes, particularly in areas in which teachers are badly paid. Fall school openings in Georgia, for example, found more than a thousand teachers gone.

Assuming a continuation of this situation, the important problem in industrial arts is whether salaries will rise or programs be curtailed.

● Three preference rating orders establishing priorities relating to schools had been issued up to the middle of October, with a new one in the process of being written. The new one will replace No. P22, covering repairs of the property and equipment for schools and colleges, expanding the scope of supplies made available. *It is interesting to know that new shop equipment and machines may be purchased under this order,* provided they are to replace equipment and machines which are entirely worn out.

The other two orders cover school busses and supplies and equipment for research laboratories.

● A blast from the Educational Policies Commission of the National Education Association, calling for eventual abolition of the NYA and CCC, is the latest development in the continuing conflict between federal youth-training agencies and representatives of local and state school systems. *The Commission contends that the national government directly controls a nation-wide program of education and training instead of working through established local and state agencies, for the first time in the nation's history.* After the present emergency has ended, necessary public work programs should be turned over to works agencies and vocational training cared for by local and state units, with the U.S. Office of Education the sole federal agency exerting leadership, according to the report.

Early in December the general report of the American Youth Commission, another private agency which has been studying the NYA and CCC, will be published. This agency has repeatedly praised the principles of work experience as part of the education of youth and national responsibility for providing work and work training for young people needing them, both of which have been exemplified in NYA and CCC programs.

Inside reports are that, no matter what changes may occur in federal agencies, *work experience and financial aid to needy youth will be permanent parts of American education.*

● By next June it is predicted that chief emphasis in the defense-training program will be on what is called conversion training. The first stage in the program called largely for refresher courses, to help students brush up on skills which were partly forgotten, and to equip those who had been unemployed for resumption of former industrial jobs. Within a few months the reservoir of eligibles for such training was nearly exhausted and the second stage, supplementary training, began. This stage provided courses to expand the scope and add to the skills of those already employed in defense work. *Now, with hundreds of thousands of skilled workers thrown out of employment in nondefense industries because of priorities, conversion training is on the increase, designed to give men and women quickly needed knowledge and skills for getting jobs in defense plants.*

● Women are on the increase in the aviation industry. One aircraft plant already places women on the same basis as men, and finds them superior in certain operations, chiefly those calling for repetitive operations in which accuracy is important. Training courses enrolling women in aviation subjects are now provided in one school in each of the following states: Indiana, Ohio, Oregon, Pennsylvania, Texas, Virginia, Wisconsin, and Wyoming. California has five such schools.

ERRATA

On page 11, third column, of the October issue of SCHOOL SHOP the bottom right-hand figure of the plate should have shown a solid line on the right-hand side instead of a broken line.

The following credits for photographs should have been included in the October number: front cover, Michigan Board in Control of Vocational Education; page 3, Detroit, Michigan, Public Schools; pages 4 and 5, Ann Arbor, Michigan, Public Schools; bottom photograph, page 6, *New York State Education.*

The front cover illustration of this issue is courtesy of the U.S. Office of Education, and those on pages 2 and 3 were taken by the U.S. Army Air Corps.

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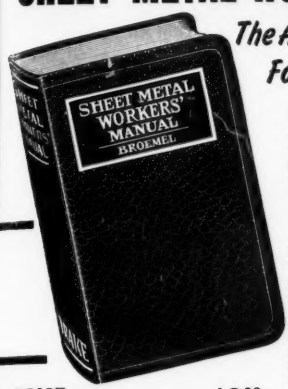

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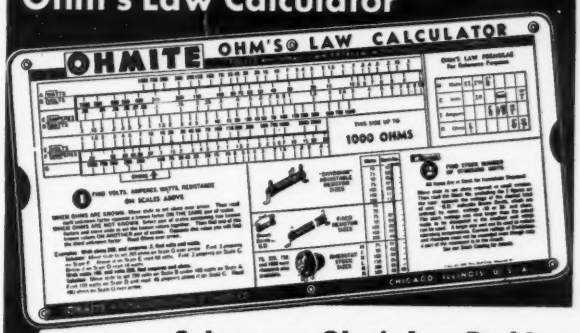

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